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UNIVERSITY OF ALBERTA

GIFTED LEARNING DISABLED: METACOGNITIVE READING STRATEGIES

BY

© KATHERINE LESLEY MCGUIRE

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment of the requirements for the degree of MASTER OF EDUCATION

IN

SPECIAL EDUCATION

DEPARTMENT OF EDUCATIONAL PSYCHOLOGY

EDMONTON, ALBERTA

(FALL, 1991)

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K. Lesley McGuire

877 Timberline Drive,
Fort McMurray, Alberta
T9K 1E9

July 2, 1991
Date

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THE FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled GIFTED LEARNING DISABLED: METACOGNITIVE READING STRATEGIES submitted by KATHERINE LESLEY MCGUIRE in partial fulfillment of the requirements for the degree of MASTER OF EDUCATION in SPECIAL EDUCATION.

Dr. Carolyn Yewchuk (Supervisor)

Fern Snart

Dr. Fern Snart

Moira F Juliebö

Dr. Moira Juliebö

DATE: July 26, 1991

Abstract

This exploratory study employed a descriptive case study to examine the metacognitive reading processes of three gifted learning disabled (gifted/Ld) students, two boys and one girl who were in grades 5 and 6. The purpose of the study was to investigate the knowledge that gifted/Ld students have about the reading process and to explore the types of reading strategies used by gifted/Ld students on a reading comprehension task. Specifically, the study examined the students' awareness of evaluation, planning, regulation and conditional knowledge components of reading. Additionally, the gifted/Ld students' performance on a reading comprehension think aloud task was examined to explore their independent use of planning, evaluation and regulation strategies.

The three students were defined and identified through the use of Wechsler Intelligence Test for Children-Revised and two reading tests, the Woodcock Reading Mastery Tests-Revised and the Burns-Roe Informal Reading Inventory. Background information was collected and the academic history of each student was examined.

The focus of the study was the metacognitive reading assessment which comprised a metacognitive questionnaire, the Index of Reading Awareness (Jacobs & Paris, 1987) and a think aloud reading task. The results revealed that the gifted/Ld students were aware of the importance of self-evaluation when reading and were knowledgeable about when and why to use a number of reading strategies. The results also indicated that the three gifted/Ld students actively monitored their reading progress and reported using evaluation, planning and regulation strategies when reading. However, the three students did not appear to be proficient in executing the appropriate strategies effectively.

Although general trends in metacognitive awareness and executive processes were found, an analysis of the students' individual responses on the metacognitive assessment indicated significant individual differences in the specific knowledge of strategies, the types of strategies reported and the way in which the strategies were implemented and used. These individual differences highlight the complexity of the comprehension process in reading. Information from the in-depth study of the reading processes may help researchers and teachers obtain a better understanding of the way these gifted/Ld students think and learn. This information may also be useful in developing individual programs, instructional strategies and assessment techniques for the gifted/Ld students.

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Chapter I

STATEMENT OF THE PROBLEM

Introduction to the Problem

> The ability to read well is one of a person's most valuable achievements. Our world is a reading world. It would be difficult to find any activity, whether in school, in the home, on the farm, in business, in the professions, or even in recreational pursuits that does not require at least some reading ability. Often reading is an indispensable channel of communication with an everwidening world.
> (Bond, Tinker and Wasson, 1979, p. 3)

Society's concern for literacy is reflected in the proliferation of research and specialized education programs focusing on students exhibiting academic difficulties in learning to read. Although most gifted children excel in school and thus are frequently excellent readers, one subgroup of the gifted population appears to struggle with reading tasks. This population is currently referred to in the literature as "Gifted Learning-Disabled" (gifted/Ld) as they excel in one or more areas while at the same time have learning problems in others (Baum, 1988; Lupart, 1990; Yewchuk, 1985). This exploratory study has been undertaken to investigate the learning processes of three gifted/Ld students on a reading comprehension task. It will examine the relationship between the students' awareness of metacognitive knowledge and thinking strategies in reading and their demonstrated use of metacognitive knowledge and thinking skills on a reading task.

Historically, the study of giftedness and of learning disabilities developed independent from each other. Gifted education can be traced back to the ancient Greeks, who identified gifted individuals based on superior intelligence and physical stamina. During the Tang dynasty, the early Chinese recognized and cultivated the literary ability, leadership, imagination and original thinking of child prodigies (Davis & Rimm, 1989). Specialized education for gifted children therefore, was traditionally defined by describing very specific qualities applicable to a narrow range of the population, such as high intelligence quotients or superior skills or abilities. The gifted were frequently stereotyped as superior in all areas.

In contrast, some children, for no apparent reason, have difficulty learning to read or write. These students' problems plagued educators for many years and as a result gave rise in the last century to the field of learning disabilities. Specialized education for learning disabled students focused on children with school learning problems and led to the stereotypic belief that these children were deficient learners and were inferior students. In addition to the development of two separate disciplines, further divergence of these two fields occurred as a result of separate teacher training programs, different instructional strategies, and different procedures for funding these programs (Yewchuk, 1985).

However, in the last decade, a broadening of the definitions of both giftedness and learning disabilities has led to widespread changes in their use and has made it possible for some children to fall into both categories simultaneously. Although there is a broad diversity of characteristics and terms for learning disabilities, as illustrated by Cruikshank who identifies more than 40 terms used in the literature pertaining to essentially the same group of learning disabled children (Senf, 1977), a number of components are common in most recent definitions. These components include average or above average intelligence, a discrepancy between potential and actual performance, a disorder in basic psychological processes, and learning problems which cannot be attributed to any other syndrome such as visual, motor, or hearing handicaps; mental retardation; emotional disturbance; environmental, cultural, or economic deprivation (Winzer, Rogow, & David, 1987). In practice, a learning disability is generally diagnosed when a child functions at least two grades behind actual grade placement in one or more school subjects. Therefore, in using contemporary definitions of learning disabilities it becomes evident that in spite of deficits in one or more of the areas mentioned, students who are identified as learning disabled may possess superior skills in other areas.

Presently, in the field of gifted education, one of the most extensively cited definitions of giftedness is the United States Office of Education (USOE) definition (Education Consolidation Act, 1981), which identifies gifted children as those "possessing demonstrated or potential abilities that give evidence of high performance capabilities in areas such as intellectual, creative, specific academic, or leadership ability, or in the performing and visual arts, and who by reason thereof, require services or activities not ordinarily provided by the school." (Sec. 582). This multi-faceted definition, which includes potential as well as demonstrated ability, implies that a child who is gifted in one area need not be gifted in another. Combined with evidence from case studies and biographical reports indicating that some individuals have learning difficulties while at the same time having gifted abilities, this multi-faceted definition has given rise to the conceptualization of gifted learning/disabled.

The Problem

Research regarding the gifted/Ld is presently not extensive, and the focus has primarily been descriptive and theoretical in nature. Due to the paradoxical characteristics of these gifted/Ld students, the difficulties in conceptualizing the existence of an individual who is gifted and learning disabled simultaneously, and the possibility that a number of students "gifts" or disabilities are not readily apparent (Fox, Brody & Tobin, 1983), identification of gifted/Ld students is extremely difficult. The difficulty of identifying the gifted/Ld has been well documented in the literature (Daniels, 1983; Elkind, 1973; Senf, 1983), and consequently research has been aimed almost exclusively at the identification and characteristics of gifted/LD students. Lupart (1990) indicates that in focusing primarily on the identification of this population, in-depth assessment to identify specific programming needs of these students has been overlooked. Jacobson (1984) notes that with the exception of several special model programs (Daniels, 1983; Fox, Brody & Tobin, 1983; Whitmore, 1980), relatively few programs for the gifted/Ld have been developed to address their specific needs. Many of the students identified as gifted/Ld are often served in an ordinary classroom setting or through a resource room model which emphasizes remediation of weaknesses, structuring the environment, teaching basic skills in a step-by-step hierarchy, and extensive drill and practice. This type of program may be inappropriate and may not be effective with gifted/Ld students who have been characterized as highly intelligent students possessing highly developed reasoning, problem solving and comprehension skills (Baum, 1988; Jacobson, 1984; Tannenbaum & Baldwin, 1983). Research has demonstrated that a focus on weaknesses at the expense of developing strengths or "gifts" can result in boredom, stress, poor self-esteem, and a lack of motivation (Baum, 1988; Whitmore & Maker, 1985). Instead, Yewchuk (1985) recommends that the gifted/Ld students need a stimulating educational environment which emphasizes higher thinking processes.

Reading problems are the most predominant type of learning difficulty apparent in the learning disabled population (Gearheart, 1985). Kirk and Elkins' (1975) study indicates that approximately two thirds of the programs for the learning disabled were centered on remediating reading difficulties. Like the learning disabled population, many gifted/Ld students also exhibit difficulties in developing skills in reading. Systematic studies are necessary in order to increase the understanding of the reading strategies utilized by gifted/Ld students, and to develop programs which challenge them both in their areas of strength and in their areas of weakness.

In summary, in attempting to address the needs of the gifted/Ld population, research studies have primarily focused on identification of these children. Assessment for the purpose of identification provides very limited information to develop specialized individual programs for gifted/Ld students. Although numerous studies recognize the need for individual programming to meet the special needs of gifted/Ld students, researchers have not examined extensively the thinking processes that gifted/Ld students use when reading. There is a paucity of research which uses in-depth multi-method evaluation procedures to identify individual strengths and weaknesses of gifted/Ld students, and as a result, little is known about how these gifted individuals process information when reading.

The purpose of this study is to examine the thinking processes of gifted/Ld students and to explore their use of metacognitive knowledge and thinking skills in order to determine specific instructional needs in reading comprehension. More specifically, the purpose of the study is to examine gifted/Ld students' awareness of planning, evaluation, regulation and conditional knowledge, as measured by Jacobs and Paris' (1984) Index of Reading Awareness. Additionally, the performance of gifted/Ld students on a reading comprehension task will be examined to explore their independent use of planning, evaluation and regulation strategies for reading, in a think aloud reading task.

As this study is exploratory in nature, several general questions serve to guide and focus it. They are as follows:

1. Are gifted/Ld students aware of planning, evaluation, conditional knowledge and regulation strategies used in reading comprehension, as measured by the Index of Reading Awareness?
2. Do gifted/Ld students demonstrate the use of planning, evaluation, and regulation strategies on a think aloud reading task?
3. Do gifted/Ld students detect errors when reading a passage?
4. Do gifted/Ld students use compensatory methods to solve comprehension problems when reading?

Assumptions of the Study

Underlying this study is the assumption that students are actively involved in the reading process and that they are able to verbalize and describe their own metacognitive processes while performing a reading task. Since metacognitive processes cannot be observed directly, it is impossible to state that some of the students are not using metacognitive strategies. The only conclusions that can be made are that the subjects have not verbalized their use of such strategies.

Definitions

Since the terms used in the study are somewhat unique to the area, the definition of the most pertinent terms will be briefly summarized.

Metacognition refers to thinking that is "meta" or "beyond" cognition and includes both the knowledge and regulation of one's own cognitive processes (Flavell, 1976).

Metacognitive Knowledge refers to an individual's accumulated and stored knowledge about person, task and strategy variables and how these variables affect one's performance in reading. It is limited to the deliberate and conscious knowledge that can be reported and is a prerequisite to taking actions within a learning situation. Metacognitive knowledge has been divided into four major components: evaluation, planning, regulation, and conditional knowledge (Paris & Jacobs, 1984).

> Evaluation involves the awareness of one's present knowledge, own resources, and the goals of the task.
>
> Planning includes the awareness of the importance of formulating goals and systematically selecting specific reading strategies to achieve specific goals when reading.
>
> Regulation refers to an awareness of monitoring and self-regulation strategies and includes knowing how to use various strategies when reading.
>
> Conditional Knowledge involves knowing when to use a specific strategy and knowing why that specific strategy would be effective. It is the knowledge of the conditions that affect learning.

Executive Control Processes are self-regulatory mechanisms used to direct and exercise control over reading activities. They involve the application of knowledge into actions and include evaluating the effectiveness of the individual's own comprehension, selecting appropriate strategies, regulating the effectiveness of these strategies and repairing these strategies as necessary when reading. Control processes therefore are manifested in the evaluation, planning, and regulation of an individual's own actions.

Gifted Learning-Disabled (Gifted/Ld) are students who score at least 125 on one of the Verbal or Performance Scales of the Wechsler Intelligence Test for Children-Revised. Additionally, reading achievement is at least 1 1/2 years below grade level, as measured by a standardized achievement test, the Canadian Test of Basic Skills.

Verbal Protocol is a subject's verbal description of his or her mental activities engaged during reading.

Overview of the Investigation

The present chapter has introduced and stated the problem of the research. Next the purpose of the research has been described and the four major research questions have been provided. The assumptions of the study have been presented and a number of terms defined. The remainder of the study is organized as follows:

Chapter II contains a review of the current literature related to the study. The review is divided into three sections and begins with the theoretical framework of reading and metacognitive processes. The second section examines research methods and studies on metacognitive awareness and executive processes in reading. The third section reviews present studies on metacognition in reading relating specifically to special populations and includes a review of studies on the learning disabled, gifted, and gifted learning disabled populations.

The third chapter describes the research design utilized in the study. It includes information on the selection of the sample, screening instruments, research instruments, pilot studies, and procedure for the main study. It also provides details regarding the self-report questionnaire and think aloud error detection techniques used to assess metacognition in reading, as well as the details regarding the method used to code and analyze the students' reading protocols.

Chapter IV contains the findings of the study. The data is presented in the form of three individual case studies of the gifted/Ld students. A comparison of the students' metacognitive awareness and use of reading strategies will follow.

The final chapter, Chapter V, contains a brief summary, conclusions and limitations of the study. Implications for individual programming and implications for further research are also discussed.

Chapter II

SELECTIVE REVIEW OF THE LITERATURE

The purpose of this literature review is to provide background information on the metacognitive processes in reading. Current conceptualizations and frameworks of reading and reading processes are examined. Metacognitive reading processes are then isolated and metacognitive knowledge and executive reading processes are discussed. A selective review of studies on metacognition and reading details the use of the self-report interview technique, the error detection paradigm and the think aloud technique in assessing the metacognitive components of the reading process. The final section of the chapter reviews studies on metacognition and special populations, including the learning disabled, gifted and gifted/Ld populations.

Theoretical Framework of Reading Processes

Reading is a complex cognitive activity that involves perceptual processes, cognitive skills and metacognitive processes. Many prominent researchers in the area of reading see comprehension as the primary goal of the reading process (Goodman, 1973; Pearson, 1984; Smith, 1971). Writers such as Goodman (1970) indicate that "meaning must always be the immediate as well as the ultimate goal in reading" (p. 155).

In the past, researchers have attempted to delineate the reading process using concepts and terminology from the human information processing theory. Reading theories have been grouped into two broad categories within which reading is viewed as a "bottom-up" or "top-down" cognitive processing activity (Stanovich, 1980). The "bottom-up" models of processing information can be described as a series of discrete stages, progressing from lower level visual data to higher level encoding skills (La Berge & Samuels, 1974; Samuels, 1970; Stanovich, 1980). Within this framework, reading is assumed to begin with an analysis of letter features and clusters of letters, progressing to analysis of words, strings of words and finally to sentences. Meaning is assessed at each level until eventually understanding of a sentence is achieved. These "bottom-up" models are now seen as inadequate in explaining the reading process as they fail to explain how higher level cognitive processes can affect lower processes (Stanovich, 1980).

Reading has also been represented in "top-down" perspectives, whereby the reader is viewed as a problem solver who uses conceptual knowledge of the world to form hypotheses about what is being read (Goodman, 1970; Smith, 1982). Goodman suggests that reading is a "psycholinguistic guessing game" involving the "interaction between thought and language" (1970, p. 260). The print then is analyzed to confirm or adjust the hypotheses made by the reader, and thus the direction of processing is from the reader's conceptual knowledge downward. These "top-down" models have been criticized for their vagueness and for their incomplete explanation of the process of recoding text into internal speech, as observed by many researchers (Stanovich, 1980).

Therefore, "top-down" and "bottom-up" models conceptualized within an information processing framework appear to offer dichotomous interpretations of the reading process. Both models are now seen as inadequate as they fail to explain existing research data on reading comprehension. However, an interactive view of the reading process has evolved from these two models. The interactive model conceptualizes reading as the simultaneous processing of background information brought to the text by the reader and information from the text itself (Rumelhart, 1977). Rumelhart's (1977) interactive model isolates the reading process into six levels, semantic, syntactic, lexical, word, letter clusters and letters, and illustrates that processing of information may occur simultaneously and integratively within and between several levels. An underlying idea emanating from the interactive model is that the reader is an active information processor who uses a variety of information sources to construct meaning from the text. Consequently, both background knowledge and controlling or regulation of the information processing are essential components in reading comprehension and have together been referred to in the literature as metacognition.

Contemporary reading research has been influenced by Rumelhart's interactive perspective (Baker, 1982; Brown, 1980; Paris, 1984; Myers & Paris 1978). As a result, a number of researchers have begun exploring developmental processing differences between beginning and skilled readers and processing differences between skilled and poor readers on reading comprehension tasks. These studies have examined the metacognitive components of reading comprehension.

Metacognition and Reading

Metacognition is regarded by cognitive psychologists as a central component in reading comprehension (Brown, 1980; Flavell, 1976; Garner, 1987; Paris & Oka, 1989). However, there is some disagreement among researchers as to what the basic characteristics of metacognition are, or how to operationalize the term. The term metacognition, therefore, is an ambiguous concept in the literature as it has not always been defined or applied consistently within different areas of psychology.

Flavell (1976) first introduced the concept and referred to metacognition as thinking about thinking or the awareness of one's own cognitive processes. Ann Brown (1980) later extended this concept of metacognition to include the control or self-regulation of one's own cognitive processes and applied this concept to research in reading. Consequently, within the context of reading, metacognition has been divided into two broad classes which encompass both the knowledge about the cognitive domain and the executive strategies that regulate thinking (Jacobs & Paris, 1987).

Metacognitive Knowledge

Metacognitive knowledge is characterized by three important variables, person, task and strategy variables that help learners effectively remember and comprehend what they are reading (Brown, 1978, 1980; Flavell & Wellman, 1977).

- **Person variables** or the knowledge of learner characteristics involves the awareness or knowledge of the individual's own ability, the individual's familiarity with the material and the ways in which characteristics affect learning.
- **Task variables** include awareness and consideration of the specific features of the reading passage that influence comprehension as well as an awareness of the purposes of reading.
- **Strategy variables** include the awareness of strategies and thinking processes that readers engage to understand the text.

Paris, Lipson, and Wixon (1983) expanded and incorporated the person, task and strategy variables into a more extensive framework of metacognitive knowledge. They categorized metacognitive knowledge into three components: declarative, procedural and conditional knowledge.

- **Declarative Knowledge** includes both person and task variables and encompasses the knowledge of personal abilities, task characteristics, reading goals and the structure of a task.
- **Procedural knowledge** is similar to the strategy variable but is more complex. It includes knowledge of a repertoire of strategies and knowledge of how to use the various strategies when reading. For example, processing knowledge may include knowing how to identify the main idea in a passage or how to skim a passage. Understanding the procedures of an action are fundamental to performing a reading strategy.
- **Conditional knowledge** which is the third knowledge component identified by Paris, Lipson, and Wixon (1983), extends the framework of metacognitive knowledge beyond the original person, task, and strategy variables. It refers to knowing when and why to apply various strategies in order to achieve a goal in reading and involves adjusting the individual's own behavior to meet various task demands.

These three kinds of knowledge, declarative, procedural, and conditional, enable readers to select and use various strategies in order to comprehend what they are reading. Metacognitive knowledge therefore involves recognizing these internal and external variables during the reading process and includes the awareness of strategies and skills necessary to perform tasks effectively. However, within the reading literature, most researchers limit this knowledge about reading processes to deliberate and conscious knowledge which can be reported (Brown, 1981). For the purposes of this study, automatic skills, in which the reader is not consciously aware of his or her own cognitive processing of information, will not be considered metacognitive.

Executive Control Processes

The second component of metacognition is the control of cognition or "executive control" (Brown, 1980). Executive processes have been described as "the control structure governing the behavior of thinking man [sic] in a given task" and include "a strategy or program that marshals cognitive resources for performance of a task" (Simon, 1979, p. 42). It is this marshalling or regulation function that is the defining characteristic of executive processing. Within the context of reading, executive processes involve the actual processing of important information, the selection of learning strategies appropriate to a given task, the use of these strategies when reading, and finally the monitoring of success or failure of these strategies. A number of executive processes which have been identified and isolated in reading research and can be measured on reading performance tasks include planning, monitoring, evaluating and modifying processes (Brown 1980, Brown, 1981; Lawson, 1984).

The executive control of thinking involves the application of knowledge into actions or task activities and is often referred to as "comprehension monitoring" in the reading literature (Baker & Brown, 1984a). Comprehension monitoring has been conceptualized as a multidimensional process involving the operation of two component processes, evaluation and regulation (Baker, 1985). Paris and Jacobs (1984) also view comprehension monitoring as a multidimensional process but have divided it into three essential components: evaluation, which involves a reader's assessment of his or her own understanding while reading; planning, which includes "the selective coordination of a cognitive means to a cognitive goal" (Jacobs & Paris, 1987, p. 259); and regulation, which is an ongoing process that involves adjusting the individual's own strategies according to the individual's progress in reading and the demands of the task.

Research Studies on Metacognition and Reading

Research on reading development and the differences between good and poor readers has recently focused on the metacognitive components of reading. Metacognition is usually divided and the components studied independently. Research on knowledge components of metacognition emphasizes what information learners bring or fail to bring to reading situations. In contrast, research on executive control focuses on and emphasizes the control learners bring or fail to bring to the reading task, the deliberate actions that facilitate comprehension.

In keeping with the separation of metacognition into metacognitive knowledge and strategy use components, the following review of the literature will be divided into three sections. The first section will examine studies exploring metacognitive knowledge differences in readers. This will be followed by a discussion of the studies on executive control or self-regulation aspects of reading. The third section will review two studies that examine both metacognitive knowledge and control processes in relation to reading comprehension.

It is evident from reviewing the literature that some studies have compared "good" and "poor" readers and others "skilled" and "unskilled" readers. For the purposes of this review, the terms "good" and "skilled" readers will be considered synonymous as will the terms "poor" and "unskilled", and Garner's distinction between the two will be used to "indicate a contrast between two points on a continuum of reading proficiency" (Garner, 1987, p. 31).

Metacognitive Knowledge

Despite the numerous assertions about the importance of metacognitive knowledge in the acquisition of reading skills, relatively few studies have explored the relationship between metacognitive knowledge and reading. Researchers have been hampered by the difficulty of measuring metacognitive components which are virtually invisible as they occur within a child's head. Many studies on children's knowledge about reading have used interviews to measure awareness or metacognition. As Baker and Brown (1984b) state, "one simple way of assessing what children know is to ask them" (p. 358). Both highly structured interview procedures, in which the same questions are asked in the same way to each individual, and relatively unstructured interview procedures, in which the collection of questions is not standardized and the individual's response determines the ensuing questions, have been used in metacognitive research for examining age and reading achievement differences between students.

The following review of research studies on metacognitive knowledge will focus on research investigating age-related differences in metacognitive knowledge. In addition, studies comparing the metacognitive knowledge of good and poor readers will be reviewed to examine the relationship between metacognitive knowledge and reading achievement.

Age effects

Reid (1966) conducted one of the first studies using interviews to measure metacognitive knowledge or awareness in reading. She discovered that four- and five-year-old children could not identify or describe the function of letters, words, or punctuation in a written passage. More importantly, Reid found that the children in her study could not accurately identify the purpose of reading. Clay (1972) and Johns (1980) also observed a similar lack of knowledge in beginning readers and found that the novice readers were uncertain as to whether they should read the pictures or the print.

The first comprehensive study of age-related differences in metacognitive knowledge was conducted by Kreutzer, Leonard, and Flavell in 1975. Their study explored the metacognitive knowledge of memory components of elementary children in kindergarten and in grades 1, 3, and 5. The students were interviewed informally, using an open-ended questioning approach designed to sample the person, task and strategy categories of metacognitive memory. The major finding of this investigation was that older children knew substantially more than younger children about the variables affecting their memory performance. Older children were able to provide a greater number of strategies to assist them in recalling information and were aware that some tasks were more difficult to remember than others. This study in the area of memory was one of the first to demonstrate a number of age-related differences in metacognitive knowledge.

Within the context of reading, Myers and Paris (1978) conducted a study focusing on metacognitive knowledge in relation to reading processes. The researchers modelled their study after Kreutzer, Leonard and Flavell's (1975) study, using an open-ended interview technique incorporating person, task and strategy variables. Children aged eight and twelve were interviewed individually, and using the children's free responses from the scripted interview, Myers and Paris examined the knowledge about reading processes reported by the children. They found that younger children were less aware than older children of the effects of many knowledge variables on reading and appeared to focus more on the decoding aspect of the reading process. The researchers also found that younger children did not appear to be aware that motivation is linked to the reader's performance on a reading task, that reading silently is much faster than reading out loud, and that the initial and final paragraphs are especially important in a reading passage. Additionally, younger readers did not know that rereading parts of a passage is an important method for resolving comprehension problems, or that skimming means reading the words that produce the most information.

Overall, an item by item analysis of interview questions revealed general increases in metacognitive knowledge with grade level. The results indicated that young children were unaware of many important parameters of reading, and suggested that young children were not as sensitive to person dimensions or the need to use different strategies for different reading materials or reading purposes. While some children were sensitive to some task variables such as interest or familiarity with the story, they were unaware of the role of initial and concluding sentences in paragraphs. Older children were more aware of the effects of many variables on reading and were more aware of the utility of strategies for reading comprehension. As a result of this initial study, Myers and Paris demonstrated age-related differences in metacognitive knowledge and concluded that with increased age, children demonstrated greater metacognitive awareness in reading.

In a further study examining metacognitive knowledge and age-related differences in reading, Miller and Bigi (1979) replicated the interview portion of Myers and Paris' (1978) study. Additionally after a two to three week interval, they repeated the interview but this time the subjects were provided with several answers for each item from which they could choose. In an attempt to minimize the verbalization required by the subjects in the study, Miller and Bigi were able to use a more quantitative analysis of the data and reduce the subjectivity required in assessing the subject's responses on each item. The researchers found that even when the verbalizing demands of the interview were reduced, developmental differences in the awareness of the reading process were observed.

These research findings on age differences in metacognitive knowledge indicate that younger children particularly in the first two years of school demonstrated significantly less knowledge about reading than did older elementary students. Older children were more knowledgable about themselves, the reading tasks, and the strategies they may need to employ when reading.

Metacognitive knowledge and reading achievement

In addition to age-related differences in metacognitive knowledge, a number of researchers have explored the relationship between metacognitive knowledge and reading achievement. Paris and Myers (1981) compared the metacognitive knowledge of good and poor grade 4 readers. The subjects were asked to read a narrative passage and then recall the story. The subjects reported their studying activities and were asked to rate the utility of 25 reading strategies on a 9-point scale ranging from "helps a lot" to "hurts a lot" (Paris and Myers, 1981). Results of this study show that good readers had a better knowledge about reading strategies, and poor readers appeared to be less aware of the effect of detrimental reading strategies on reading comprehension. The good readers were also able to remember the text better than poor readers and detected errors in the text more frequently than did the poor readers. One notable feature of study is the researchers' attempt to assess metacognitive knowledge and actual reading performance for the same group of children. Moreover, the study provides evidence for the relationship between faulty knowledge and poor performance in recalling what was previously read. Evidence of a relationship between metacognitive knowledge and reading performance supports the importance of metacognition in the acquisition of reading comprehension skills.

In a study using both an interview and experimental manipulation Canney and Winograd (1979) analyzed the beliefs of children about reading. Students aged 8, 10, 12, and 14 were selected and poor readers were identified using a standardized reading test. The subjects were presented with passages that were either coherent or disjointed and were asked if each passage could be read and why. Researchers found that the poor readers and the younger readers had greater difficulty with this task as they attended more to decoding the text. Older and more proficient readers attended more to the meaningful aspects of the text and were more knowledgeable of the purpose of reading. Older and more proficient readers also knew that the goal of reading was to understand or make sense of the text. This study illustrates the developmental shift in children's metacognition about the purpose of reading and also illustrates that a lack of awareness of the proper purpose of reading impairs the reading processes of both young and poor readers.

Forrest and Waller (1980) also found evidence supporting the developmental change in metacognitive awareness between grades 3 to 6. They interviewed 144 students in grades 3 and 6 to determine the relationship between children's metacognitive knowledge about decoding, comprehension and strategies of reading for a purpose, in relation to their age. However, they also divided the subjects within each grade into three reading levels (good, average and poor readers) based on their scores on a standardized reading test. Outcomes from the study demonstrate that metacognitive knowledge about decoding, comprehension and reading for a purpose not only increased as children became older but showed a definite pattern of increase in relation to reading proficiency. The items which differentiated poor from good readers and older from younger readers highlighted that younger and poorer readers possessed fewer strategies and knew less about decoding, comprehension and the purposes of reading. The findings in this study provide evidence that poor readers and younger readers display common deficiencies in metacognitive knowledge. Both poor and young readers were deficient in their awareness and knowledge of the reading task and in their knowledge of the purpose and the utility of reading strategies. Poor and young readers also possessed a limited awareness of a repertoire of reading strategies.

Summary

A fundamental form of metacognition is the awareness of one's own learning which is dependent on one's knowledge of three major factors: task, strategy, and learner characteristics. Major research findings in the area have demonstrated that there are a number of important differences among readers of different ages and different abilities. Studies have illustrated that young children and poor readers have important knowledge gaps and misconceptions about the reading processes and that poor readers and young readers share common views of the reading process. Both young readers and poor readers lack the awareness that they must attempt to make sense of the text they are reading and consequently they view reading as a decoding process rather than a metacognitive task.

Executive Control Processes in Reading

Recognition of the importance of executive control processes in reading has led to numerous related research studies in recent years. Two different research methodologies have been used by researchers in an attempt to explore students' self-regulation processes when reading. The following selective review of the literature begins with an examination of both qualitative and quantitative studies using the error detection methodology. These studies compare comprehension monitoring strategies of good and poor readers at different grade levels, and also examine how students evaluate their own reading comprehension. The second part of the review will present studies which use the think aloud technique to explore executive control processes in reading.

Error detection paradigm

A popular paradigm which has frequently been used in measuring executive control is the "error-detection" paradigm. In using this procedure, the researcher presents the subject with a reading passage that has a number of errors embedded within the passage, and then observes if the subject detects the problem and how the subject reacts to solve the problem. The rationale for using this procedure is that subjects should notice the problems embedded in the text if they are keeping a careful check on their understanding. The ability of children to detect errors in a reading passage is presumed to be reflective of their use of comprehension monitoring strategies (Baker, 1979, 1984; Garner, 1987).

Garner & Kraus (1982) did a series of error-detection studies to investigate the monitoring strategies of children. In a study using good and poor readers in grade 7, they attempted to discover if differences exist in error-detection between the two groups. Thirty grade 7 students were given two narrative passages with conflicting information inserted in different places within the passages and were asked to read the passages to determine if the text should be revised by the writer. Researchers found that none of the students who were initially identified as poor comprehenders detected the inter- or intra-sentence inconsistencies within the passages, whereas a number of the students identified as good comprehenders detected inter-sentence difficulties and the majority of the good comprehenders detected intra-sentence difficulties. Researchers thus concluded that poor comprehenders did not appear to engage in comprehension monitoring tasks when reading. Both qualitative and quantitative data supported their hypothesis that differences exist between good and poor readers in the way they monitor their comprehension when reading. However, researchers were unable to determine why these differences occurred and concluded that "poor monitoring facility could be either a cause or a result of poor comprehension--or both a cause and a result" (Garner 1980, p 61).

Paris and Myers (1981) also viewed comprehension monitoring as an essential component of reading comprehension and used the error detection paradigm to compare comprehension monitoring skills of good and poor readers in grade 4. In the first section of a two-part experiment, Paris and Myers examined the differences in comprehension monitoring between good and poor readers during oral reading. In comparing the frequency of their monitoring, the researchers found that the poor readers' faulty monitoring was due not to lower levels of monitoring but rather to less accurate comprehension checking. This evidence suggests that poor readers do indeed monitor their reading; they hesitate when they approach a problem and do attempt to use self-correcting strategies to solve problems when reading. However, poor readers in the study did not appear to evaluate and regulate their understanding as accurately or effectively as the good readers. Again, the reasons for inaccurate comprehension monitoring skills in poor readers were unknown.

Further evidence of inaccurate comprehension monitoring skills of poor readers was demonstrated in the second part of Myers and Paris' (1981) experiment in which they compared good and poor readers' strategies for deriving meaning from difficult vocabulary words. Researchers found that poor readers failed to ask questions, take notes or use a dictionary as often as good readers when attempting to comprehend the meaning of what they were reading. Consequently, the poor readers did not notice and resolve as many comprehension problems as the good readers.

In summary, Myers and Paris' comprehension monitoring studies revealed significant differences between good and poor readers in the use of three distinct aspects of comprehension monitoring. The results indicated that poor readers monitor their reading comprehension but that their evaluation strategies which involve checking their current state of knowledge while reading, were less effectively used than the good readers strategies. Moreover, planning and regulation strategies which comprise selecting, implementing, monitoring, and revising reading strategies were also used less effectively.

Further studies using the error detection paradigm have revealed that the accuracy in children's detection of errors improves with age and reading ability (Baker, 1979; Baker & Anderson, 1982; Garner, 1982; Winograd & Johnston, 1982). Good readers and experienced readers detect more errors, identify errors more frequently, and select more appropriate and successful strategies to repair the errors while reading with higher frequency.

Another study on comprehension monitoring differences approaches the problem from a different perspective and attempts to look at how readers evaluate their own comprehension (Baker, 1984). Children aged 5, 7, 9 and 11 years old were presented with six short narrative passages, within which three different types of problems were inserted: nonsense words, internal inconsistencies and prior knowledge violations. Each of these three problems requires the application of different evaluation techniques. For example, to detect a nonsense word subjects must evaluate their understanding of individual word meanings, whereas to detect internal inconsistencies within a passage, subjects must evaluate the consistency of the ideas expressed in the passage. The subjects were explicitly instructed to find the mistakes in each paragraph and were given immediate feedback after each trial. Results indicated developmental differences in evaluation skills used in self-monitoring of comprehension in reading tasks. Older children found all three problems more effectively than younger children. Although all students were able to detect errors in internal consistency, these errors were found to be the most difficult errors to identify. These results illustrate the need to consider the types of problems embedded in a passage. Detection of different problems requires applying different criteria in the evaluation component of reading comprehension.

Think aloud technique

One serious limitation of the error detection paradigm, identified by a number of researchers, is the difficulty in determining why subjects do so poorly on identifying the problems (Baker, 1979; Winograd & Johnston, 1982). A number of reading researchers have adopted the "Think Aloud" technique to assess metacognitive components of the reading process. In this method the investigator asks the subjects to think out loud while reading and then records and analyzes these verbalizations in a systematic way.

Kavale and Schreiner (1979) investigated metacognitive differences in the use of reading strategies of average and above average grade 6 students using the think aloud methodology. The subjects were directed to read a passage and answer a multiple-choice question. They were then asked to describe aloud the reasons for accepting or rejecting their choices on the multiple choice-question, and the resulting protocols were analyzed both descriptively and statistically. Findings from this study were similar to the results of the numerous error detection studies indicating that differences between above average and average readers exist. Although it was found that both groups used similar comprehension strategies, above average readers applied the strategies more efficiently and with greater success. Several other studies using the think aloud strategy also found that older and proficient readers evidence greater flexibility in using reading comprehension strategies (Jacobs & Paris, 1987; Meyers & Lytle, 1986).

Summary

The research studies on executive control processes in reading revealed both qualitative and quantitative differences between good and poor readers in the way they monitor their comprehension. Major findings using both the error detection and think aloud techniques demonstrated that there are a number of important differences among readers of different ages and abilities. Studies demonstrated that the accuracy of comprehension monitoring increases with age and reading ability. In comparing the frequency of comprehension monitoring while reading, studies revealed that poor readers monitored their comprehension as frequently as good readers; however, poor readers evaluated and regulated their reading comprehension less efficiently and less effectively. Correspondingly, studies comparing average and above average readers indicated that both groups of students used similar comprehension strategies. However, the good readers used the strategies more effectively and with greater success. Developmental differences in the evaluation components of self-monitoring comprehension were also evident.

Review of Studies Exploring the Relationship Between Metacognition and Reading Comprehension.

Two comprehensive studies were designed to examine the relation between both the awareness and use of metacognitive strategies in reading and the effects of instruction on metacognitive knowledge and performance. Paris and Jacobs (1984) interviewed 8- and 10-year-old students both before and after using a metacognitive intervention designed to increase student's awareness and understanding of reading comprehension strategies. The interview was a revised version of the Myers and Paris (1978) instrument which evaluated the metacognitive awareness and knowledge of reading processes in three general areas: evaluation of one's own reading abilities and of the reading task, planning to reach a predetermined goal, and self-regulation of reading through the use of monitoring strategies. To enhance reading comprehension, each group then received four months of classroom instruction on how, when, and why to use reading strategies. Standardized reading tests, cloze reading tasks and error-detection tasks were administered.

Results of this study clearly demonstrate that interview measures can distinguish children's metacognitive knowledge on the basis of age and reading proficiency. Additionally, the study demonstrates that children who were more aware of person, task and strategy variables also scored higher on reading comprehension tests. Furthermore, the data provide evidence that metacognitive instruction can improve children's awareness and understanding of reading strategies. However, the authors failed to demonstrate any significant increases in reading comprehension on a standardized reading comprehension test as a result of classroom instruction. Paris, Cross and Lipson (1984) provided an explanation for this difficulty by suggesting that measures on standardized tests were too general to discriminate specific differences in strategy proficiency and thus may be insensitive to variations in specific learning experiences.

Forrest-Pressley and Waller's (1984) comprehensive study of children's metacognition also reported somewhat confounding results. The researchers correlated measures of metacognitive awareness about reading with the performance of grade 3, 6 and 12 students on the Gates-MacGinitie reading achievement test. Relatively low correlations, .12 for grade 3 and .20 for grade 6 were found between the reported awareness of decoding and actual reading performance. However, these correlations may underestimate the importance of metacognitive components in reading as researchers have questioned the use of the Gates-MacGinitie reading test for measuring metacognitive components of the reading process (Paris, Cross, & Lipson, 1984).

These two comprehensive studies on metacognition and reading processes, as well as many of the error detection and think aloud studies, illustrate the difficulties that researchers have had in attempting to measure the metacognitive components of reading. However, all the studies demonstrate that differences exist between good and poor readers and younger and older readers in the use of monitoring, evaluation, and planning strategies when reading.

Metacognition and the Conception of Intelligence

Intelligence is an elusive concept that researchers have been struggling to define and measure throughout the last century. Attempts to understand intelligence have drawn upon psychometric theories which define intelligence in terms of a general intelligence factor or "g factor". These psychometric theories of intelligence propose that individual differences in performance on intelligence tests are a result of individual differences in underlying factors of intelligence such as verbal or reasoning abilities (Spearman, 1931; Thorndike & Lohman, 1990). For example, individuals who are gifted are seen to possess greater amounts of "g" or general intelligence and thus receive higher scores on measures of intelligence.

Although most research on intelligence has focused on the "products" of intelligent thinking, researchers have recognized the need to focus greater attention to the "processes" that constitute intelligent thinking and how individuals think, process information and solve problems. Recent theories of intelligence have begun to incorporate conceptions of metacognition within their frameworks to explain the way individuals process information. From this perspective individual differences in cognitive processing are examined not only quantitatively but also in terms of qualitative differences in the way individuals approach and solve problems (Das, Kirby & Jarman, 1975; Sternberg, 1985). Perhaps the most comprehensive theoretical work to date had been done by Sternberg (1984; Sternberg & Davidson, 1983) who consolidated both the executive control and knowledge components of metacognition into a comprehensive theory of intelligence.

Sternberg's "Triarchic" theory of intelligence (1985) contains three subtheories: a Contextual subtheory which encompasses the individual's purposive adaptation, shaping, or selection of the present environment, an Experiential subtheory which includes an individual's experience with tasks or situations and involves the "novelty" or "automaticity" in which an individual responds to a situation or task, and a Componential subtheory which describes the cognitive structures and processes that underlie intelligent behavior.

It is within the Componential subtheory that Sternberg incorporates the concept of metacognition. This subtheory specifies three types of information processing:

"metacomponents" and "performance components" which are similar to executive control processes in metacognition, and "knowledge-acquisition components" which expand upon the concept of metacognitive awareness. More specifically, metacomponents consist of executive processes used in planning, monitoring, and evaluating one's own information processing. Performance components however, are the processes used to solve a problem and actually execute the plans assembled by the metacomponents. Therefore, while the metacomponents decide and plan what to do, the performance components carry out the plans. The third component within Sternberg's componential subtheory of information processing is knowledge acquisition and comprises the skills used to learn or acquire new information, retain and retrieve information previously acquired, and to transfer or generalize retained information from one situation to the next.

Consequently, by incorporating metacognitive components into his theory of intelligence, Sternberg (1985) proposes that skilled or gifted individuals' superior skills are linked to superior metacomponential skills, to the speed or "automatized" way in which they process information, and to their ability to apply their expertise in specific domains. Shore and Dover (1987) support this hypothesis and assert that gifted individuals and individuals with above average intelligence are "distinguished by a high level of metacognition in combination with flexibility and adaptability from a large repertoire of cognitive styles" (p. 38). As models of intelligence incorporating information processing elements are relatively new, researchers such as Sternberg and Shore and his colleagues are presently directing studies to explore these hypotheses. Further research is necessary to fully explore the relationship between metacognition and intelligence.

In summary, recent conceptualizations of intelligence incorporating metacognition provide a process-based approach in which to examine individual differences. Analyzing and evaluating the ways students process information may provide further insight into the different approaches that students use to solve problems. Moreover, examining qualitative differences in the way students process information may be particularly useful in understanding gifted learning disabled students, who exhibit high IQ scores on individual intelligent tests and exceptional achievement in some academic areas while at the same time performing far more poorly than their intellectual potential would predict in one or more academic areas.

Metacognition and Special Populations

Interest in metacognition has spread in recent years as researchers have extended their studies beyond the regular classroom to explore metacognitive thinking skills in special populations. Current interest in metacognition and special populations relates to an ongoing debate in special education concerning whether learning disabled and gifted children think, process information and solve problems in qualitatively different ways from other children, or whether they process information in a similar manner but at a different rate (Sternberg, 1985; Wong, 1986).

Studies examining metacognitive reading skills of learning disabled children seek to determine if metacognitive differences exist between unskilled or weak readers and those identified as learning disabled. Additionally, many of these studies explore whether learning disabled students possess an adequate repertoire of strategies and knowledge about reading. These studies provide insight into the types of problems learning disabled children may experience when reading. Similarly, studies on metacognitive processes of gifted children explore cognitive aspects of giftedness and seek to enhance our understanding of the nature giftedness.

The following section reviews studies of metacognitive awareness and reading strategies of learning disabled readers, gifted students and gifted/Ld students.

Metacognition and the Learning Disabled

Although the majority of the reading studies on metacognition have been with good and poor readers, learning disabled students have recently become the focus of research in this area. The majority of these studies have investigated the executive processes and strategy training, and have neglected to address the knowledge component of metacognition in reading (Borkowski, Weying & Carr, 1988; Clark, Deshler, Schumaker, Alley & Warner, 1984; Wong & Jones, 1982). These studies have found that in comparing learning disabled students to average students, the learning disabled students more closely resemble younger, average-achieving children than their peers. Learning disabled students have been found to possess fewer planning, monitoring and evaluation strategies, they tend to be less flexible in their use of strategies and they often evidence "production deficiencies" as they fail to use the knowledge and strategies that they do have (Wong & Jones, 1982; Wong & Wong, 1986).

Numerous researchers have hypothesized that one reason that learning disabled students have difficulty comprehending what they are reading is that they lack comprehension monitoring skills. In a self-questioning training study, Wong and Jones (1982) examined the effects of teaching grade 8 and 9 learning disabled students to monitor their reading comprehension. Results from the study demonstrated that training learning disabled adolescents in comprehension monitoring strategies increased their awareness of the important elements of text. The application of self-questioning strategies following the training program resulted in increased performance in reading comprehension scores. Interestingly, the average grade 6 students who also received training did not significantly improve in reading comprehension after the same training, and this lack of improvement was attributed to their spontaneous use of comprehension strategies when reading. The authors concluded, therefore, that the results support Torgeson's (1977) view of the learning disabled students as passive or inactive. The results also suggest that one cause of comprehension problems in learning disabled students may be inadequate metacognitive skills in reading. Similar findings were reported by Borkowski and Kurtz (1987) and Clarke, Deshler, Schumaker, Alley, & Warner (1984).

In summary, research in the area of metacognitive reading processes characterizes learning disabled students as passive learners who fail to use metacognitive knowledge, comprehension monitoring skills, or appropriate strategies in reading comprehension. Learning disabled students are also characterized as possessing fewer strategies than average students, and their repertoire of strategies, although similar to average students, appears to be more narrow and restrictive. However, studies have demonstrated that despite their deficits in reading strategies, learning disabled students can significantly increase their reading performance with strategy training (Borokowski & Kurtz, 1987; Clarke et al., 1984; Wong & Jones, 1982).

Metacognition and the Gifted

Research on gifted students has been directed predominately to the global characteristics of this group, and only a small number of studies have focused on metacognition and reading comprehension. Sternberg (1984, 1985) has assimilated the concept of metacognition into a comprehensive theory of intelligence and has related metacognitive components to a theory of giftedness. Chatman and Williford's (1982) study examining gifted students' awareness and use of cognitive strategies while solving problems illustrates the direction of research in the area of giftedness and metacognition. The researchers administered a structured interview with a sample of grade 4 gifted students to assess the awareness of cognitive strategies while solving problems. In a second part of the experiment, subjects were asked whether particular strategies could have been helpful in solving a number of problems. Results suggest that although the gifted students were knowledgeable about person, task and strategy variables, they did not necessarily use their metacognitive knowledge appropriately.

Wingenbach (1982, 1984) also explored the metacognitive knowledge and reading strategies of gifted readers using a metacognitive awareness questionnaire. Findings of the studies indicated that gifted students were able to identify reading strategies, assess their comprehension while reading, select and use specific reading strategies and evaluate or modify the strategies to increase comprehension when reading. One notable strategy that was identified in the studies, which had not been previously noted in research, was the use of imagery by gifted students to assist in reading comprehension.

Overall, in terms of metacognitive knowledge, exploratory studies comparing gifted and average students indicate that gifted children demonstrate greater awareness of reading processes (Wingenbach, 1982). Gifted students also report the use of strategies more frequently and employ more effective evaluation, planning, monitoring and use of reading strategies (Mitchell & Irwin, 1985; Wingenbach, 1984). Exploratory research on metacognitive reading processes, therefore, characterizes gifted students as more fluent and interactive in the reading process.

Metacognition and the Gifted/Ld

In terms of the gifted/Ld population, there is a paucity of research in the area of metacognition, and little is known about the metacognitive awareness and use of reading strategies of the gifted/Ld students. Hannah (1989) is one of the first researchers to explore the metacognitive knowledge and metacognitive skills used by gifted/Ld students in reading and has published the initial results of a large comprehensive study being completed in the area. The purpose of the study was to compare the performance of the gifted/Ld students to that of gifted, average ability and learning disabled students in an interview assessing reading awareness and in a think aloud reading task. In a qualitative review of the results of three subjects, one who was learning disabled, one who was gifted and one who was gifted/Ld, Hannah noted that some significant differences were apparent. She indicated that gifted and gifted/Ld students made significantly longer verbalizations on the think aloud task than did the learning disabled student. Both the gifted and the gifted/Ld students appeared to relate the information they were reading to their background information and made predictions about what they were reading based on this background information. Another difference noted by Hannah was that gifted and gifted/Ld students both used look-back strategies to try to comprehend a sentence they did not understand, whereas the learning disabled student did not appear to use this strategy. Moreover, when the gifted and gifted/Ld attempted to decode and comprehend unknown words in the passage, their verbal responses indicated that they were attempting to comprehend the meanings of the words. However, it was not clear from the learning disabled student's verbalization if he was trying to comprehend the material, as he did not verbalize an attempt to understand the unknown words, nor did he associate any meaning with these words. Therefore, the preliminary results of this study seem to indicate that the gifted/Ld student appears to process information when reading in a manner more similar to the gifted student than to the learning disabled student.

Chapter Summary

Contemporary models used in understanding children's reading suggest that reading is a deliberate cognitive activity in which readers actively construct meaning from their own prior background knowledge and from the ideas suggested by the text. This interactive view of reading comprehension emphasizes the readers' ability to control and regulate their comprehension and has resulted in the current focus on metacognitive processes in reading. Researchers have divided metacognitive processes in reading into two components: metacognitive knowledge and executive control of reading. Metacognitive knowledge refers to the readers' awareness or knowledge of their own cognitive processes and includes declarative, procedural and conditional knowledge components. The second metacognitive component, self-regulation or executive control processes, emphasizes the strategic components of reading and encompasses evaluation, planning, and regulation of one's own thinking when reading.

Research studies investigating metacognitive reading processes typically examine metacognitive awareness and executive processes independently. Measurement of metacognition has been particulary challenging as researchers have moved beyond traditional measures of the product of reading to discover methods of measuring reading processes. Interview methods have repeatedly been used by researchers to measure students' metacognitive awareness of reading, and both the error detection paradigm and think aloud techniques have frequently been used in an attempt to measure self-regulation or executive control processes.

The majority of research studies on metacognitive reading processes have contrasted skilled readers with unskilled readers and older readers with younger readers. Older and more proficient readers are reportedly more aware of the important reading variables than younger and less skilled readers. Older and skilled readers also appear to monitor and regulate their reading comprehension more frequently, whereas younger and less skilled readers seem to monitor inadequately their understanding of what they are reading.

Few research studies have investigated metacognitive reading awareness and executive control processes using special populations. Studies conducted with learning disabled students have almost focused exclusively on executive processes and strategy training. Although learning disabled students appear to be aware of many reading strategies, they seldom or inadequately use strategies to understand what they read. As a result, learning disabled students have been characterized in the literature as "inactive" readers who exhibit strategy "production deficiencies" when reading. Studies also demonstrate that significant increases in reading performance occurs after receiving strategy training.

Research on metacognition with gifted students has also been quite limited in the area of reading. Several of the studies examining gifted children have indicated that their awareness of reading strategies is greater than that of average readers. Gifted readers also seem to be more interactive in the reading process and also report more frequent strategy use than average readers.

In the gifted/Ld population, the focus of research has primarily been upon defining and identifying these students, and little research has examined the metacognitive reading processes of these students. These special students, who conceivably have unique special skills or "gifts," while at the same time possessing a learning disability, require programs to address their individual needs. However, more information is needed about the way they process information if we are to understand and develop suitable and challenging programs for these children. Are these students highly aware and knowledgeable about person, task, and strategy variables in reading like gifted students? Do they demonstrate the use of executive control strategies when reading, and if so, what types of strategies do they use? This study attempts to address these general questions and the specific research questions outlined in chapter one.

Chapter III

RESEARCH METHOD AND DESIGN

Introduction

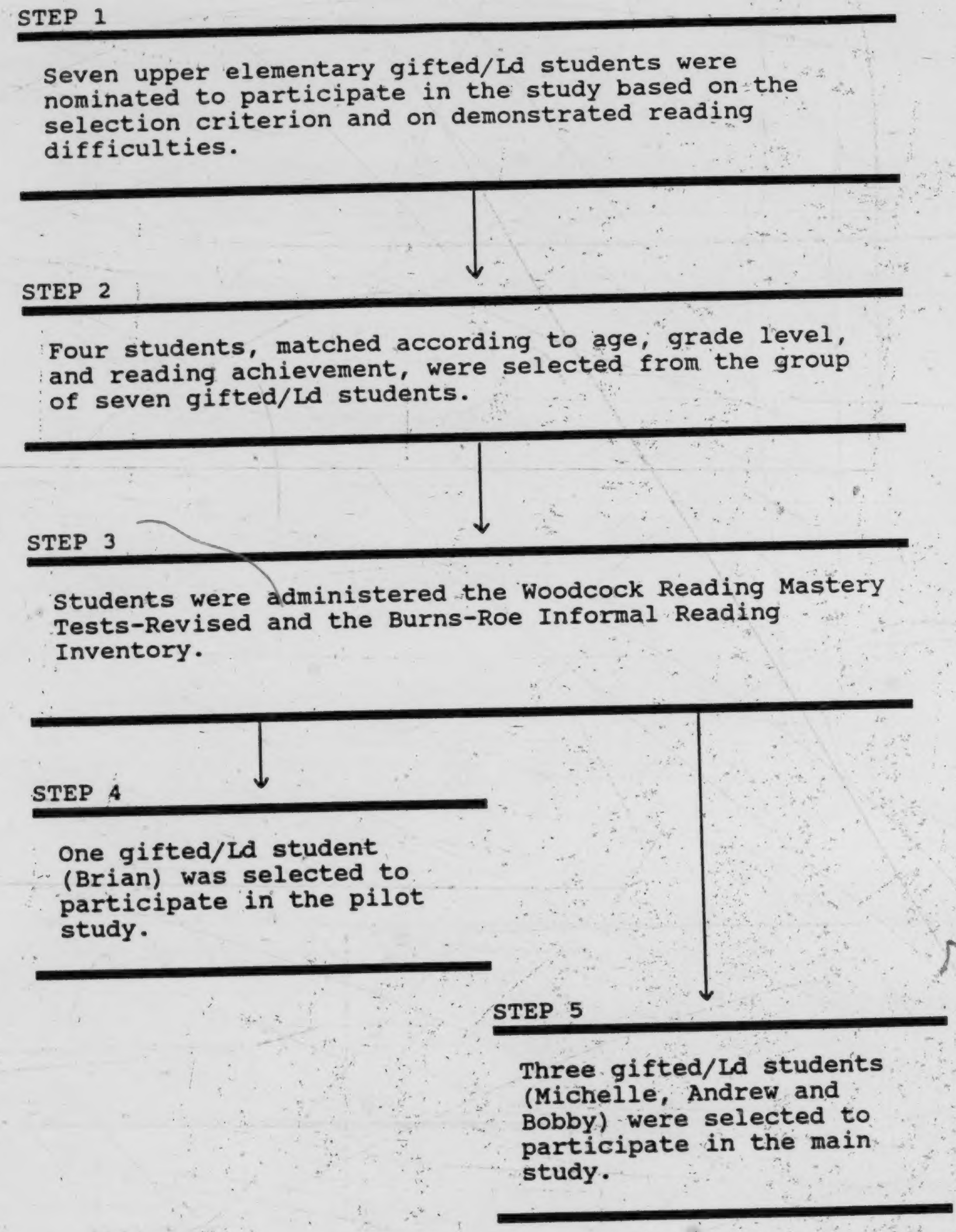
This chapter contains a description of the research design including the sample selection and a detailed account of the research procedures. The chapter is divided into five sections and begins with a discussion on the selection of the subjects. The remaining sections in the chapter describe the screening and research instruments which were fundamental to the study, the pilot studies, data collection procedures, and coding and data analysis procedures.

Selection Procedures

The identification and selection of the gifted/Ld students was completed in several stages. The sequence of stages is outlined in Figure 1 and is discussed in detail in the following section.

Initially, seven gifted/Ld students from the Edmonton Catholic School District were identified and chosen to participate in the study. These students were nominated by the district's consultant in special education on the basis of four selection criterion which included IQ, reading achievement, grade level, and reading difficulties exhibited

Figure 1: Procedure for Selecting Gifted/Ld Students



STEP 1

Seven upper elementary gifted/Ld students were nominated to participate in the study based on the selection criterion and on demonstrated reading difficulties.

STEP 2

Four students, matched according to age, grade level, and reading achievement, were selected from the group of seven gifted/Ld students.

STEP 3

Students were administered the Woodcock Reading Mastery Tests-Revised and the Burns-Roe Informal Reading Inventory.

STEP 4

One gifted/Ld student (Brian) was selected to participate in the pilot study.

STEP 5

Three gifted/Ld students (Michelle, Andrew and Bobby) were selected to participate in the main study.

in the classroom. The criterion used to define the students as gifted/Ld are as follows:

a. the students scored at least 125 points on one of the verbal or performance scales on the Wechsler Intelligence Test for Children-Revised (WISC-R),
b. the students' reading achievement was at least 1 1/2 years below grade level as measured by the reading subtest of the Canadian Test Of Basic Skills,
c. the students were identified by the school system as experiencing academic difficulties.

Although the intelligence scores of the gifted/Ld students selected in this study were somewhat lower than the standard 130 IQ cutoff required by most gifted programs, research in the area of intelligence has suggested that very few children who have language disorders achieve scores of 135 points or higher (Rawson, 1968). As a result of a learning disability, the gifted/Ld population is more likely to demonstrate depressed IQ scores and, consequently, the standard commonly used as the cutoff criterion for inclusion and classification as gifted/Ld is 125 points (Fox, 1983).

In addition to the selection criteria, protocol research requires that the students read with some proficiency, to ensure the understanding of the experimental materials and to eliminate the possible interference from word recognition problems (Garner, 1982; Meyers & Lytle, 1986). Consequently, the selection of the students was limited to those who were at the grade 5 level or above.

Initial screening and assessment of intellectual ability and reading skills of the gifted/Ld students was completed prior to this study by school personnel. The selection of gifted/Ld students was based on the most recent (completed within the last 6 months to a year) intellectual assessment and reading achievement scores. These tests have standardized administration and scoring procedures, and thus the results are expected to be relatively consistent between and within classrooms.

Since the selection of the subjects was based on achievement and intellectual assessments completed prior to this research, the school staff was informally asked to corroborate reading difficulties and to identify any students who should not be involved in the study because they experienced recent emotional disturbance, or extended illness, or because English was not their native language. As well, teachers were asked about the verbal ability of the students to ensure that each student was capable of participating in the think aloud reading procedure.

From the original group of seven students, four subjects were selected to participate in the study: one for the pilot study and three students for the main study. The four students selected for the study were closely matched on the basis of (a) age: they ranged from 10-years 8-months to

12-years 1-month, (b) grade: three were in grade 5 and one was in grade 6, and (c) reading achievement: their reading comprehension skills ranged from grade 2-6 to 3-6 as measured by the reading subtest on the CTBS administered at the end of the previous school year. An attempt was also made to match students of similar socioeconomic status. The background information gathered on each student prior to the study is outlined in Table 1.

Table 1

A Summary of Background Information on

Each Gifted/Ld Student

Background Data	Michelle	Andrew	Bobby	* Brian
Age **	12-1	10-8	11-11	10-3
Grade	5	5	6	5
WISC-R:				
Verbal IQ	108	115	125	103
Performance IQ	129	130	104	129
Full Scale IQ	120	125	118	117
CTBS (Administered May, 1990)				
Computations	6-7	5-1	5-8	4-7
Reading	3-2	3-6	3-5	2-6
Punctuation	3-8	3-9	3-6	3-0
Vocabulary	---***	5-0	6-0	1-8

* Student selected for Pilot Study
** Age as of March 1, 1991
*** Scores not available

Letters containing a brief description of the project and a permission form were then sent home and signed by the parents of the four gifted/Ld students who were identified for the research study. The four students were administered two diagnostic reading tests, the Woodcock Reading Mastery Tests-Revised (Woodcock, 1987) and the Burns-Roe Informal Reading Inventory (Roe, 1985).

Following the administration and scoring of the Woodcock Reading Mastery Tests-Revised (WRMT-R), one student was chosen from the group of four gifted/Ld students to participate in a pilot study. This student (Brian) had the lowest Total Reading Score, Word Attack, Word Identification, and Reading Comprehension scores and was selected in order to evaluate the passage difficulty on the think aloud task. The rationale for using the student with the lowest reading scores was that if the weakest student was adequately able to detect the errors and think aloud while reading the passages, then it was extremely probable that the procedure would be successful with the three higher achieving readers used in the main study.

Screening Instruments

Two diagnostic reading tests were individually administered to the four students selected to participate in the study. These tests, the Woodcock Reading Mastery Tests-Revised and the Burns-Roe Informal Reading Inventory, were used to obtain a measure of the students' current level of functioning in reading.

The Woodcock Reading Mastery Tests-Revised (Woodcock,1987)

The Woodcock Reading Mastery Tests-Revised (WRMT-R) was administered to the four gifted/Ld students to provide a standardized measure of reading comprehension, decoding, and overall reading ability. The WRMT-R is an individual diagnostic reading test containing four basic tests which include Word Identification, Word Attack (of nonsense words), Word Comprehension and Passage Comprehension. The test was normed on a sample of 6089 subjects from 60 different communities in the United States. Continuous year norms were collected on a sample of 4201 subjects ranging from kindergarten to grade 12 using a stratified sampling design which controlled for community size, race and socio-economic status.

Internal consistency reliability using split-half reliabilities corrected by the Spearman-Brown formula were reported for all tests, clusters, grades and age levels. The median Full Score reliability is .98 with subtest scores ranging from .87 to .97. The concurrent validity coefficient with the Woodcock-Johnson Reading Tests for all grades ranged from .60 to .91. The concurrent validity coefficient at the grade 5 level with the Wide Range Achievement Test and Woodcock-Johnson Reading Tests is .87, and with the Peabody Individual Achievement Test-Revised is .78.

Form G was administered to the four gifted/Ld students. The Total Reading Cluster Score, which was calculated using the students' scores from the Word Identification and Passage Comprehension scores, was used to compare the students' overall reading ability. The Word Attack Error Inventory from the test was used to record and analyze word attack errors on the test.

The Burns-Roe Informal Reading Inventory (Roe, 1985)

The Burns-Roe Informal Reading Inventory (Form A) was administered individually to each subject to determine reading levels and to obtain qualitative information on word recognition and oral reading comprehension skills. The inventory consists of Graded Word Lists, based on the McNally and Foresman basal reading series, and Graded Passages, based on Spache and Fry Readability formulas, which assess oral reading comprehension, individual word recognition and word recognition in context.

Strict standardization and administrative procedures were not used in designing the instrument because the reading inventory is an informal assessment tool. Instead, readability formulas and field testing with 90 students at each grade level were used to ensure that the passages increased in difficulty and the face validity of the revised

(1985) edition of the test was increased by adding several more reading comprehension questions to each passage and by using longer passages than the 1980 version.

The Graded Word lists from the inventory were used in this study to determine an appropriate grade level at which to begin administering the oral reading passages. The students' word recognition errors were analyzed using miscue analysis methods described by Roe (1985), which involves classifying miscues into the following categories: insertions, mispronunciations, omissions, repetitions, substitutions, refusals and reversals. The students' oral reading comprehension skills were determined by the students' performance on comprehension questions which accompanied each reading passage. The students' answers to these questions were divided into main idea, detail, cause and effect, inference, and vocabulary categories and were analyzed using Roes' (1985) Comprehension Skill Analysis procedure detailed in the manual.

The students' word recognition and comprehension performance on each passage were also rated using the Independent, Instructional, and Frustration levels as detailed in the manual. The students' performance on the Informal Reading Inventory ranged from the late grade 3 to early grade 4 level for oral reading comprehension. On the Word Recognition Scale, three of the students' skills were the grade 4 level and one of the student's skills were approximately at an early grade 6 level. These instructional level scores on both the word recognition and oral reading comprehension tests were used as the basis for determining the level of paragraphs to be used by the gifted/Ld students on the think aloud error detection task. Paragraphs at the grade 4 reading level were selected to ensure that the think aloud material was challenging enough so that the subjects were aware of the thinking processes they were using, and to ensure that the words were not too difficult so that the students could attend to the meaning of the passages rather than focusing on decoding the text.

Research Instruments

Measurement of the dependent variables was obtained through the use of the Index of Reading Awareness (IRA), which was developed by Paris and Jacobs (1984) to measure metacognitive awareness in reading comprehension, and a think aloud technique which was developed to measure metacognitive awareness and control of executive processes on a reading comprehension task.

The Index of Reading Awareness

Jacobs and Paris (1987) developed the Index of Reading Awareness (IRA) to assess objectively children's knowledge about reading. This metacognitive questionnaire measures four types of metacognitive knowledge: planning for specific reading goals, evaluating one's skills and the reading tasks, regulating one's own reading progress, and conditional knowledge which involves applying strategies to meet specific goals. The IRA questionnaire was designed using the framework from earlier interview studies (Myers & Paris, 1978; Paris & Jacobs, 1984), which were constructed using Flavell and Wellman's (1977) categories of person, task and strategy variables and included 33 Likert-Scale items and 19 open-ended questions. In revising the original interview instrument, the present IRA questionnaire used response frequencies from earlier interviews to develop three multiple-choice alternatives for each item. Fifteen of the open-ended questions, including five items relating to each of the planning, evaluation, and regulation categories of self-managed reading were used. A fourth category of questions was devised to measure what Paris and Jacobs refer to as "Conditional Knowledge" -- the understanding of when and why specific strategies should be applied (Paris & Jacobs, 1984).

The IRA was developed to overcome two major weaknesses that plagued previous interview studies of metacognitive processes in reading. First, many of the initial metacognitive interview instruments employed vague or open-ended questions such as "what is reading?" (Johns, 1980) and the ensuing results were often ambiguous or indeterminate (Canney & Winograd, 1979; Ericsson & Simon, 1980). Second, in using open-ended questioning techniques, researchers were frequently inundated with an enormous amount of information to encode and analyze (Kirby & Moore, 1987). To overcome some of these weaknesses, the IRA questionnaire was designed using a multiple-choice format.

The IRA was developed for use in research with students from grades 3 to 6 comprising reading abilities from grades 2 to 7. It provides an overall measure of metacognitive awareness and also yields four individual subscale scores for each of the evaluation, planning, regulation and metacognitive knowledge domains.

The items on the **Evaluation** subscale were designed to measure the student's knowledge about the reading task and about his or her own reading abilities. An example of an evaluation item on the IRA is the question, "What is special about the first sentence or two in a story?" (Item 3, Jacobs and Paris, 1987, p. 269).

The items on the **Planning** subscale appraise the student's use of reading strategies in a systematic fashion. An example illustrating this category is the following: "Before you start to read, what kinds of plans do you make to help you read better?" (Item 4, Jacobs & Paris, 1987, p. 269).

The **Regulation** subscale assesses the student's self-monitoring skills and ability to use alternate strategies when necessary. A sample regulation item is the question, "What do you do if you come to a word and you don't know what it means?" (Item 3, Jacobs & Paris, 1987, p. 270).

The **Conditional Knowledge** subscale evaluates the student's knowledge of when to use a specific strategy and why that strategy would be effective. An item from the IRA which illustrates this is the question, "If you were reading for a test, which would help the most?" (Item 2, Jacobs & Paris, 1987. p. 270).

The IRA questionnaire contains 20 multiple-choice items consisting of three alternatives from which the subjects may choose. The questions and alternatives are read out loud to the subject, and either the interviewer or the subject may record the response to each item. The multiple-choice alternatives are scored using a point-value system. Two points are given if students select strategic responses indicating an awareness of the goals and strategies of reading, 1 point is rewarded for responses which are adequate but do not allude to a specific cognitive strategy, and no points are given if the student selects an inappropriate response or selects a response which denies that a problem exists.

The test-retest reliability of the IRA instrument based on 544 elementary school subjects was $r = .55$, $p <.001$ after an eight month interval (Jacobs & Paris, 1987). Although this reliability coefficient may appear somewhat low, the large interval of time between the testing for the test-retest reliability should be noted. Given the length of time, the reliability score indicates that the instrument has some stability.

Initial evidence of construct validity was provided by Paris and Oka (1986), who correlated student performance on the IRA questionnaire with the Gates MacGinitie Reading Comprehension Test. Pretest correlations for grade 3 and 5 students were $r = .41$; $p < .01$, and $r = .33$, and post-test correlations of $r = .37$ $p < .01$ and $r = .40$, $p < .01$ were found. Paris and Oka also found that good readers and students receiving instruction in reading strategies revealed greater awareness of important reading strategies than poor readers and readers in a control group, which suggests that the IRA is sensitive in discriminating reader differences.

Think Aloud Technique

Recent research in reading suggests that reading comprehension is more than merely the accumulation of a number of skills but rather is a complex process that involves the ability to reason and solve problems effectively. Because reading is largely a mental process, reading comprehension processes cannot be observed or measured directly. Protocol analysis methodology, which requires the subject to "think aloud" while reading, is one method that has been used to infer what is going on in the heads of children as they attempt to construct meaning from text.

The think aloud technique is an informal assessment procedure that uses the readers' verbal self-reports about their thinking processes. It requires the reader to stop and describe out loud what he or she was thinking after reading each clause, phrase, sentence or passage in a text. Using these procedures, the researcher does not impose structures or strategies on the reader's thought processes. The reader simply expresses his or her thoughts after reading a sentence. The resulting protocols are then analyzed in an attempt to isolate and describe the reading strategies and processes that are used by the students. Consequently, the data reveal, to a certain extent, how the reader actively structures his or her own comprehension when reading.

Although there is some scepticism about the use of verbal reports in research, Ericsson & Simon (1980) have argued that such data can be an important source of information about cognitive processes. Norris (1990) substantiates their conclusions of the validity of verbal reports by demonstrating that the use of think aloud methodology does not alter the subject's thinking and reading performance. Protocol analysis has also been compared to other introspective and retrospective verbal report techniques used in studying the reading process, and the comparison reveals that verbal descriptions from a think aloud procedure more closely match the actual thought processes of readers (Kavale & Schreiner, 1979).

Several advantages that this approach offers are that the subjects report their reading behavior rather than the process, there is minimal delay between reading and responding so the subjects should easily remember what they are thinking, and the data collected closely relate to the text (Olshavsky, 1976). The think aloud strategy also derives data from the actual reading process and not from questions related to the reading text. Moreover, the subjects are not asked to theorize about their reading processes but are asked to report what they have actually been thinking while reading.

The think aloud materials for the study consisted of a practice task and two reading passages with errors embedded in the text. The practice task, which was used to get the students accustomed to thinking aloud, consisted of a maze in which they had to find their way around a house and turn off seven light bulbs (Shepherd, 1973). The two passages were taken from the Reading Skills Competency Test (Barbe, 1978), and were chosen after the initial screening had been completed and the current level of reading achievement of each gifted/Ld student had been identified. The three gifted/Ld students' achievement on the Burns-Roe Word Recognition subtest was at the grade 4 level or above.

Consequently, the passages selected for the study were at an early grade 4 level, as measured by the Fry Readability Graph (Fry, 1977).

The topics chosen for the passages included situations that are familiar to most elementary students. The passages were 13 to 17 lines long and both contained 190 words. Each passage was modified to contain six errors: three internal inconsistencies or prior knowledge violations and three sequencing errors. Internal inconsistencies involved inserting information into a sentence which contradicted information in a preceding sentence. The following is an illustration of an internal inconsistency:

> Have you ever tried to sleep with a little mosquito buzzing around? The growling keeps you awake.

The prior knowledge violations were created by inserting information that conflicted with general knowledge grade 4 students were assumed to possess:

> Walking is a good time for sleeping and letting your mind wander.

Sequencing errors were designed by mixing the order of three or four words at the beginning, middle or end of a sentence:

> A good pair of walking shoes you all is need.

The errors were equally distributed throughout the passage, in random order, and none of the errors were placed in either the first or last sentence of the passage.

The two passages used in the study appear in Appendix A. They were selected from a larger set of four passages that were administered in a pilot study to 10 grade 4 students. The two passages chosen for use in the main study were identified in the pilot study as the most interesting to read, and the error detection rate on these passages was consistently high, ranging from 75% to 95%.

The reading passages were divided into sentences and were presented in booklet form. Each sentence was located in the center of the page with one sentence of text per page. A red dot was placed at the end of each sentence, and instructions were placed at the beginning of each passage and were read to the student before the student read each passage. The think aloud directions were as follows:

> Here is a story. Read the story silently to yourself and underline any parts of the story that do not seem to make sense to you. When you see a red dot STOP and tell me what you were thinking as you were reading. You may look forward or backwards through the story at any time.

The think aloud procedure was videotaped and later viewed by the investigator and transcribed verbatim.

The Pilot Studies

Two pilot studies were completed prior to the commencement of the main study. The first pilot study was undertaken to select and check the think aloud passages. The second pilot study was completed to provide the researcher with experience in administering, scoring and interpreting the assessment battery.

Pilot Study One: The General Feasibility of the Passages

The purpose for the first pilot project was to determine the suitability of the passages. More specifically, the pilot study was undertaken to determine which passages should be used in the main study and to discover if average grade 4 students could detect the errors embedded in the passages.

Ten grade 4 students who were considered by their classroom teacher to be average readers participated in the pilot study. The students read the four passages silently and were asked to identify the errors embedded in the text (Copies of these passages may be found in Appendix A). After the students had finished reading the four passages, they identified which ones they found most interesting and explained why they underlined each error.

On the basis of Pilot Study One, the passages about mosquitoes and exercise were chosen for the study. The other two passages were dropped from the main study as a lower percentage of errors was detected in these passages (See Table 2 for the mean percentage of errors for each of the passages). They were also excluded because the majority of students found the passages on mosquitoes and exercise more interesting. No modifications were made to the errors inserted into the passages, as the six errors in each passage were identified by at least 75% of the students.

Table 2

Mean Percentage of Errors Detected on the Think Aloud Passages

Passage	Mean Percentage of Errors Detected
The Mosquito	83.3
Walking	90.1
The Market	80.2
Nature Walk	79.2

Three practice activities were also administered to the subjects in random order to determine which would provide the best warm-up and practice in thinking aloud. The three activities included: a series of pictures and statements in which the student had to identify the absurdity (Hammill, 1985), and two paper and pencil mazes (Shepherd, 1973). The students indicated that they enjoyed the verbal analogies the best; however, they tended to focus and state the error rather than relating what they were thinking while performing the task. One maze activity was selected for use as a practice think aloud activity in the main study, as the subjects easily and almost spontaneously reported what they were thinking and doing while they were completing the task.

Pilot Study Two: The General Feasibility of the Think Aloud Methodology.

The second pilot study was completed to ascertain the suitability of the screening instruments in assessing the subjects' reading skills, and to determine if the questionnaire and think aloud procedures provide appropriate data on the metacognitive reading processes of the gifted/Ld subjects. The pilot study was also used to assess the time requirements of the various tasks, and to provide the researcher with experience in administering, scoring and interpreting the assessment battery. One gifted/Ld student was chosen for the pilot project using the criteria established for the main study (See pp. 54-55), and the procedures for administering, scoring and interpreting the reading instruments were completed as outlined in the main study. The data collected from the pilot study will be presented in an interpretive case study format which will begin with a review of the background information collected, and will evaluate the results of the diagnostic reading assessment and the metacognitive reading assessment.

Personal and Educational Background Information

Brian is an 10-year 3-month-old grade 5 student who is the youngest child in a family of five. His first year in school appeared uneventful and Brian was reportedly a low average student. However, his teachers were surprised with his year-end grade 1 achievement scores on the Canadian Test of Basic Skills (CTBS), which indicated that his math computation skills were above the 95th percentile, and his vocabulary skills were in the 85th percentile.

Brian's academic difficulties became apparent in grade 2, when halfway through the year he was moved to a learning assistance center for programming in language arts and math. Brian continued to have difficulty in reading, and he attended a resource room program for thirty minutes a day for reading assistance throughout grade 3, 4, and 5. His teachers indicated that although he primarily used a phonetic approach to decode words, he experienced difficulty in identifying long and short vowels, and consonant blends. Brian appeared to make little progress in reading despite the remedial programming he was receiving in phonics and developing his sight vocabulary. He lacked motivation and interest in all reading and written activities and rarely completed classroom assignments. However, his teacher reported that he seemed enthusiastic and actively participated in classroom discussions and art activities. He also appeared to be fascinated with his science fiction "horror" card collection and would talk at length about the special make-up techniques required for actors in horror films. Brian's teachers and parents indicated that his interest went beyond the special effects and make-up, and included an intense interest in theatre set designs, and light and sound technology in television and films.

Brian's full scale score on the WISC-R places him in the high average range of intellectual ability (See Table 3). His performance IQ, which is in the superior range, indicates that his visual reasoning skills are extremely well developed. However, there was a 26 point spread between his verbal and performance scores.

Table 3

Brian's WISC-R Subtest Profile (May, 1987)

Verbal Subtest	Scaled Scores	Performance Subtests	Scaled Scores
Information	9	Picture Completion	15
Similarities	10	Picture Arrangement	14
Arithmetic	12	Block Design	14
Vocabulary	11	Object Assembly	--*
Comprehension	11	Coding	13
Digit Span	7		
Verbal IQ	103	Performance IQ	129
		Full Scale IQ 117	

* Score was not available

Brian's reading achievement scores indicated that he was performing at the grade 2-6 level. This was approximately 2 to 2 1/2 years below grade level (Refer to Table 1).

Diagnostic Reading Assessment

Brian's results on the Woodcock Reading Mastery Tests-Revised indicate that his word recognition and reading comprehension skills were about 1 to 2 1/2 years below his present grade level. These results are shown in Table 4.

Table 4

Brian's Scores on the Woodcock Reading Mastery Tests-Revised

Subtests	Grade Equivalent	Standard Score *
Word Identification	2-9	73
Word Attack	2-1	78
Word Comprehension	3-7	88
Passage Comprehension	2-7	76
Total Reading Score **	3-0	78

* The standard score has a M = 100, SD = 15.
** The Total Reading score was based on the Word Identification and Passage Comprehension Scores.

The Burns-Roe Informal reading Inventory indicated that Brian's word recognition skills were significantly below grade level (See Table 5). During oral reading tasks, Brian frequently skipped words, phrases and lines, read at an exceedingly slow pace and inserted many words as he was reading. He also substituted or guessed at a word if he could not identify the word and usually these substitutions were visually similar to the word in the text and were often meaningful within the context of the sentence read (eg. "cracked" for "creaked" or "hurried" for "hungry"). He also did not correct any of the errors he made while reading and thus did not appear to monitor his reading. As a result of his faulty decoding and inadequate monitoring skills, the majority of the oral passages read, were fabricated by Brian as he went along. Consequently, he had difficulty answering comprehension questions about the passages.

Table 5

Brian's Scores on the Burns-Roe Informal Reading Inventory

Passage Level	Word Recognition	Oral Reading Comprehension
3	99% Independent Level	85% Instructional Level
4	93% Instructional Level	40% Frustration Level
5	90% Instructional Level	50% Frustration Level

Metacognitive Questionnaire

Brian's results on the IRA questionnaire indicate that he was aware of some of the important person, task and strategy variables essential to reading (Refer to Table 6 for the scores). His metacognitive awareness was greatest in the area of planning, which involves the selection of particular reading strategies to achieve specific goals. Brian's responses on the regulation items suggest that he is aware of the importance of monitoring his progress while reading. He indicated that rereading the passage would help in comprehending the meaning of the text. However, he seemed to be unaware of what to do when he did not understand a word or sentence.

In terms of conditional knowledge, Brian was able to identify what strategies would be useful when trying to recall factual information or when studying for a test. However, he did not seem to be aware of ways to remember the meaning or main idea of narrative text, and indicated that the best strategy to use when recalling a story was to repeat all the words over and over. On the evaluation subscale, Brian's responses demonstrated that he was aware of the basic structural features of the reading text, but he appeared to have a weak understanding of his own reading capacity and limitations.

Table 6

Brian's Scores on the Index of Reading Awareness

Scale	Score on IRA	Percentage Correct
Total Score	23/40	59
Evaluation	5/10	50
Planning	7/10	70
Regulation	6/10	60
Conditional Knowledge	5/10	50

In summary, Brian seemed to be knowledgeable about some basic text features, and the importance of planning or monitoring his own reading behavior. However, Brian's responses on the IRA indicated that he lacked awareness of the importance of identifying a purpose before reading, and he appeared to be unsure of what strategies would assist him when he did not understand a word or a sentence.

Think Aloud Error Detection Task

Like many learning disabled students, Brian did not seem adept at cognitive self-appraisal. On the think aloud passages, Brian only identified 50% of the embedded word errors and none of the phrase errors. He also underlined four words in the story that he could not read and consequently assumed that because he could not read these words, they were errors in the passage. Although the metacognitive questionnaire indicated that Brian was knowledgeable about the importance of using monitoring strategies, an appraisal of Brian's performance on the error detection task indicated that his actual monitoring strategies were inadequate.

The investigator carefully examined the protocols from the think aloud task and tentatively identified six strategies which seemed to characterize those strategies the gifted/Ld student used when reading. The six strategies identified include evaluation, planning, regulation, paraphrasing and inferencing (See pp. 87-91 for definitions and examples). Table 7 displays the frequencies and percentages of the six categories of reading strategies reported by Brian. Evaluation, planning and paraphrasing strategies were reported most frequently and together comprised 86% of the strategies transcribed. The paraphrasing strategy, which involves summarizing the information presented, was reported most frequently in Brian's think aloud protocols. However, the paraphrases frequently consisted of short summaries of a small portion of the information presented in the sentence and usually made little reference to any other details presented earlier in the reading passage. Additionally, the paraphrased information was often inaccurate.

Table 7

Frequency of Reading Strategies Identified on Brian's Think Aloud Protocols

Strategies	Passage 1		Passage 2		Total	
	#	%	#	%	#	%
Paraphrase	8	29	9	32	17	30
Regulation	10	36	6	21	16	29
Planning	6	21	9	32	15	27
Inference	3	11	1	4	4	7
Evaluation	1	4	2	7	3	5
Misc.	0	0	1	4	1	1
Total	28	101*	28	100	56	99*

# Number of strategies reported
% Percentage of strategies reported on protocol
* Percentage may not add to 100% due to rounding

In the following example, the passage on Walking illustrates some paraphrasing strategies used by Brian. The portion of the text that the student reads appears in capital letters, and Brian's statements appear in lower case letters.

> WALKING IS AN EXERCISE WHICH IS AVAILABLE TO RICH AND POOR, TALL AND SHORT, FAT OR THIN, YOUNG AND OLD.

B: It's talking about all types of people that walk.

> WHAT KIND OF EQUIPMENT DOES ONE NEED FOR WALKING?

B: It's talking about how to walk.

> A GOOD PAIR OF WALKING SHOES IS ALL YOU NEED.

B: It's talking about needing shoes to walk.

Regulation strategies were also frequently reported and made up about 29% of the strategies transcribed. The majority of the regulation strategies involved the use of "sounding out" strategies to decode words, and Brian often indicated that he was focusing on reading the words accurately rather than reading for meaning. The following example illustrates Brian's use of regulation strategies to make adjustments while reading:

> THE EGG STAGE LASTS SEVERAL DAYS AND IS FOLLOWED BY A SEVEN-DAY LARVAE STAGE.

B: * S-E-V-E-R-A-L. I tried to sound it out and I can't figure it out...

* Brian sounded the word several out letter by letter but experienced difficulty with the vowels sounds as he substituted long for short vowels.

Evaluation statements were made throughout the passages and indicated that Brian was consciously aware of when he did not know the meaning of a word or sentence in the passage. An example of an evaluation statement made by Brian occurred after reading a sentence about the life cycle of a mosquito when he exclaimed, "This is hard, I don't understand this page." Planning and inferencing strategies were occasionally reported, primarily at the beginning of the passages.

Overall, Brian's think aloud protocols revealed that he was actively involved in the reading process and frequently used evaluation, regulation, and paraphrase strategies. However, a review of the protocols indicates that Brian focused his attention and reading strategies predominantly on decoding each word and that he virtually neglected comprehending the sentences or the story as an entirety. He seemed to look at each word in isolation and tried to comprehend the meaning of each individual word rather than the meaning of the sentence or passage as a whole. Consequently, while Brian used a number of strategies in an attempt to understand the passage, he often selected faulty strategies which provided little information to assist him in comprehending what he was reading. Furthermore, an emphasis on the decoding aspects of the text may have left Brian with few cognitive resources remaining for monitoring his comprehension and may explain why he could only identify

50% of the word errors in the error detection task. This focus on meaning at the word level also may explain why Brian was unable to identify any phrase errors.

Summary of Pilot Study

The pilot study affirmed that the procedures used in collecting the data were viable. Background information gathered on the student was adequate, and the student's comments on the think aloud error detection task did reveal reading strategies rather than just details about what was in the paragraphs. However, one difficulty that arose in the pilot study was that the subject incorrectly underlined many words on the error detection task. A discussion with the student about the reasons for underlining the words indicated that the student underlined the words not because the instructions for the passages were unclear, but because he had difficulty reading the words.

In summary, the pilot project revealed that the instructions were clear and that the procedures were appropriate for collecting the necessary data. The pilot study also indicated that protocol analysis would provide insight into the comprehension process.

Procedure

Data for this study was collected over a three week period in which the researcher met individually with each of the three students for two sessions. In the first session, the student was given an explanation of the project and a rationale for the testing. He or she was advised that all responses would be kept confidential and that a pseudonym would be used when reporting the findings of the study.

In the second part of the initial session, the Woodcock Reading Mastery Tests-Revised and the Burns-Roe Informal Reading Inventory were individually administered to assess the students' current level of reading achievement. The researcher also interviewed each student individually using the IRA questionnaire. The students received a copy of the IRA items to permit them to follow along as the researcher read the interview items aloud. The researcher recorded the subjects' responses on the questionnaire, and if a student was unable to answer an item, it was repeated.

In the second session, the think aloud error detection task was individually administered in a quiet room. Each student was initially given a practice think aloud task to become familiar with the procedure and the video camera. Following the practice session, the researcher gave the students a written copy of the think aloud instructions and then read the directions out loud to ensure that the students understood what they were required to do. The researcher explained the purpose for reading the passages, which was to detect any errors that the author of the passage may have made. The subjects were also told that the text could be manipulated in any way they wanted and that they could look ahead or look back at the text as was necessary. The subjects then read the sentences, stopping at each of the locations marked in the passage and verbally reporting what they were thinking as they read.

If a student neglected to report information verbally at the red dot, the researcher prompted the student by asking, "what were you thinking as you read the last sentence?" No other cues or prompts were used during the think aloud tasks. The think aloud session was videotaped and then transcribed for further analysis.

Data Analysis and Coding Procedures

Quantitative and qualitative analyses were used to examine the data collected in this study. An in-depth analysis of the data from the metacognitive questionnaire (IRA) and think aloud error detection task was completed for each individual subject, and then a comparison was made among the three students to examine similarities and differences.

The IRA questionnaire was scored based on the point-value scoring system devised by Paris and Jacobs (1984). Initially, each item was scored individually, and then the scores for the 20 questions were combined to produce a total score. The responses of each of the subjects on the individual items were then grouped into four categories, evaluation, planning, regulation and conditional knowledge strategies, and a score for each category was calculated. The total IRA score, four subscale scores and each individual item were reviewed to determine which strategies each student was most knowledgeable and least knowledgeable about.

The reading comprehension think aloud task was initially scored by counting the number of errors that each subject detected in the reading passages. The types of errors detected were then analyzed. Additionally, the students' recorded verbalizations from the think aloud task were transcribed by matching the transcriptions of the verbal protocols with the corresponding sentences in the reading passage and were analyzed in descriptive format. The technique of discrete categorization was used to evaluate each student's think aloud protocol.

In order to assess the reading strategies used by the students, mazes consisting of sounds (eg. um, ah) and interjections (eg. Yeah, Oh,) were eliminated from the transcripts. The protocols were then divided into t-units, which have been defined by Fagan (1981) as

> ...a single independent prediction (main clause) together with any subordinate clauses that may be grammatically related to it. It may be a single or complex sentence, but not a compound sentence.
>
> (p. 383)

The average number of t-units per protocol was 32. An example of a protocol parsed into t-units can be found in Appendix B.

T-units are one of three popular units of analysis used in dividing or parsing verbal protocols, and were selected as the unit of analysis in this study because the divisions corresponded most closely with the changes in reading strategies found in the protocols. Fagan and Currie (1981) suggested that the results of assigning semantic categories to units could differ because of the unit of analysis chosen. However, in a study comparing the difference between semantic categories assigned to t-units/incomplete t-units and clausal units, the researchers found that there was a significant correlation beyond the .001 level between categories assigned to t-units/incomplete t-units and clausal units. The results indicate that there is a high degree of consistency in coding reading comprehension categories when using clausal and t-units.

After reading through all the protocols several times, the coding system used to categorize the units into reading strategies was devised to effectively represent the information gathered. The three categories identified in Jacobs and Paris' (1987) IRA were used in this study. Additionally, seven other categories which arose from the students' protocols were labelled and defined to illustrate and provide structure in assessing the think aloud protocols. An outline of the 10 categories appears below, followed by a description of the category and several examples taken from protocols collected in the study.

1. Evaluation: An evaluation statement refers to "a reader's assessment of his or her current state of understanding while reading" (Zabucky & Ratner, 1989, p. 69). It involves the assessment of one's present knowledge, own abilities, and the demands of the task. It may include a specific reference to the following:

   a) the subject's own performance on the task

   Text: So the next time you hear buzz, buzz, buzz, get a can of insect repellent and go psst, psst.

   Protocol: I read that passage quite quickly and read all the words right.

   b) the subject's success or failure to comprehend what he or she is reading

   Text: Insect repellents seem to help keep mosquitoes biting.

   Protocol: This doesn't make sense...

   c) the subject's knowledge of skills needed to complete the task

   Text: Exercise is something everyone should do.

   Protocol: I know a lot about exercise because I like sports.

   Text: My mother told me many times not to let little things bother me.

Protocol: I was just trying to think about the reasons we have to do this reading.

d) any feature of the text such as the degree of difficulty or how it was written

Text: But to ever you have tried to sleep with a little mosquito buzzing around?

Protocol: "But to ever you" doesn't make sense. It is written wrong.

2. **Planning:** Planning involves an action or reading strategy, that is not carried out simultaneously, to fulfil task goals (Paris & Lindauer, 1982). It may include a specific reference made regarding the need to

   a) adjust the rate of reading

   b) skim the material to get the main idea

   c) reread the passage, or

   d) preview the title, pictures, or length of the reading material prior to reading

   Text: You swat where you think it is only to find that the little pest is somewhere else.

   Protocol: I will reread the sentence again to be sure I understand it.

3. **Regulation:** A regulation statement involves the monitoring of one's own reading progress and making adjustments as needed to reach the desired goals. It may include an explicit reference to

a) making corrections or using fix-up strategies when detecting a problem

Text: No uniform is needed.

Protocol: It doesn't make sense. Wait I think the word is U-N-I-F-O-R-M. (Sounded out) Oh, uniform.

b) adjusting the rate of reading

Text: The male bites because she needs a blood meal to provide the protein necessary for her eggs.

Protocol: The text was getting hard so I read it slower.

c) hypothesizing or predicting what will happen next in the passage

Text: But to ever you have tried to sleep with a mosquito buzzing around?

Protocol: I know the mosquito is going to bite the boy.

f) rereading a word, phrase or passage or looking back at another part of the passage just read.

Text: You swat where you think it is only to find that the little pest is somewhere else.

Protocol: I had to reread the sentence again.

4. Repetition: These statements include information that is repeated or recalled from the text in its exact form or with minor variations.

Text: Exercise is something everyone should do.

Protocol: It says that exercise is something everyone should do.

5. **Paraphrase:** A statement is a paraphrase if it outlines information from the text, deleting some of the units of information during the process. The exact words from the text or synonyms may be used in paraphrasing.

Text:	The egg stage lasts several days and is followed by a seven-day larvae stage.
Protocol:	There are two stages of mosquitoes, the egg stage which lasts two or three days and the larvae stage which lasts seven days.

6. **Synthesis:** A synthesis statement involves combining two or more units of information from the text to form a main idea or theme.

Text:	A good pair of walking shoes is all you need....As the ads say - Try it. You may like it!!!!!
Protocol:	You should try walking to decide if this is the best type of exercise for you and to make sure you like it before you go out and buy a new pair of good running shoes.

7. **Inference:** A statement is an inference if the subject adds or fills in information suggested by the text but not explicitly stated.

Text:	The growling keeps you awake.
Protocol:	I guess it's the growling in your stomach that keeps you awake at night.

8. **Expansion:** A statement is an expansion if the reader adds information or associates information with his or

her own personal experiences, to expand on what is written.

Text:	Soon you start itching and you may not even be bitten.
Protocol:	I have had many mosquito bites. You shouldn't scratch them or they will get really itchy.
Text:	Strange as it may seem, mosquitoes are more attracted to darker skinned people than they are to those with light skin.
Protocol:	Hey, mosquitoes like dark-skinned people better than they like to bite me!

9. __Opinion:__ An opinion statement involves an expression of the subject's own personal views or beliefs.

Text:	As the ads say - TRY IT. YOU MAY LIKE IT!!!!!!
Protocol:	I don't like walking.

10. __Miscellaneous:__ Miscellaneous statements encompass any responses that may not be classified under any of the previous categories. They may include vague or irrelevant responses.

Text:	Only the female mosquito bites.
Protocol:	I was thinking about nothing really.

Three further points need to be made regarding the coding or classifying of the strategies. Each of the student's responses was first analyzed and labelled to determine the types of strategies being used. Secondly, a list containing definitions of each of the categories found in the protocols was devised, the protocols were categorized, and the frequency of strategies used by each gifted/Ld student was recorded. Thirdly, the strategies were rank ordered, and a comparison of the strategies was made between the three gifted/Ld students.

To determine the reliability of the think aloud classification procedures, a reading consultant was given the protocols and was asked to identify the reading strategies in two of the six protocols. Interrater reliability was established using the formula:

$$\frac{(2 \times \text{Agreements})}{(2 \times \text{Agreements}) + \text{Disagreements}}$$

(Miles & Huberman, 1984)

The proportion of agreement between the researcher and the reading consultant for the division of the units into t-units was .98, and for the classification of the protocols into reading strategies was .95. Both of these reliability coefficients appear to be above the 90% level recommended by Miles & Huberman (1984) as an acceptable level of intra- and intercoder agreement.

Chapter Summary

Three gifted/Ld students were selected from the Edmonton Catholic School District to participate in the study. Two diagnostic reading tests were administered to each subject. Standardized reading scores were obtained quantitatively using the Woodcock Reading Mastery Tests-Revised (Form G), and the instructional levels in word recognition and reading comprehension were assessed using the Burns-Roe Informal Reading Inventory (Form A). The students' reading skills were also assessed qualitatively by analyzing the subjects' oral reading and comprehension errors on the diagnostic reading tests. A metacognitive questionnaire was administered to assess metacognitive strategy awareness, and the students' self-regulation and control of reading strategies were evaluated using two reading passages embedded with six errors. The students' verbal reports from the think aloud passages were videotaped and transcribed verbatim. Each protocol was divided into t-units using Fagan's system of parsing protocols (Fagan, 1981), and then reviewed to determine categories for reading strategies. The protocols were analyzed and ten reading strategies were evident.

Chapter IV

FINDINGS OF THE STUDY: CASE STUDIES OF THE GIFTED/LD STUDENTS

Introduction

This chapter presents the findings on metacognitive awareness and use of reading strategies for each of the three gifted/Ld students in the sample. The chapter is divided into two sections. The first section presents data obtained from the metacognitive interview and think aloud error detection task for each student. Descriptive case studies detail each student's personal history and educational background, current reading performance, metacognitive interview results and metacognitive reading strategies. A summary of the individual student's strengths and weaknesses concludes each case study.

The second section compares the three gifted/Ld students' total and subtest scores on the IRI interview and also the metacognitive strategies used on the think aloud error detection task. These results will be presented qualitatively, summarizing both the similarities and differences in metacognitive awareness and use of reading strategies, among the gifted/Ld students.

The three gifted/Ld students' actual use of reading strategies on the think aloud task will be compared. The students' results on the error detection task will also be contrasted in a detailed summary.

Case Study 1 - Michelle

Personal and Educational Background Information

Michelle (a pseudonym) was 12-years, 1-month at the time of the metacognitive reading assessment. She lives with her natural mother and a step-father who became part of the family when Michelle was in grade 1. Michelle is the middle child in a family of three girls, and both her older sister and younger half-sister are reported to be the top students in their respective classes.

Michelle's academic difficulties began in kindergarten when she was required to repeat the year because she did not possess the prerequisite number and letter identification skills for entry into grade 1. Her marks in all subject areas were below average in grade 1, and she continued to struggle throughout grades 2 to 5 in reading, science, and social studies. School records indicate that Michelle received assistance from a resource room program for several periods a week, and the focus of the program was on decoding and word analysis skills including training in phonics and breaking words into affixes and syllables. However, school reports indicate that the remedial reading programming was discontinued each year as Michelle lacked interest and made little progress in the program.

In the middle of her grade 4 year, Michelle was administered the WISC-R to assist teachers in developing an appropriate program to enhance her learning. Michelle's overall IQ score was in the superior range of intellectual functioning and a 21 point difference between her verbal and performance IQ was apparent. (See Table 8). Michelle's Performance IQ places her within the superior range of intellectual ability while her verbal IQ, which was significantly lower, fell within the average range.

Table 8

Michelle: WISC-R Subtest Profile (December, 1989)

Subtest	Scaled Score	Subtest	Scaled Score
Information	9	Picture Completion	14
Similarities	15	Picture Arrangement	14
Arithmetic	11	Block Design	13
Vocabulary	10	Object Assembly	16
Comprehension	12	Coding	13
Digit Span	10		
Verbal IQ	108	Performance IQ	129
	Full Scale IQ	120	

The CTBS achievement test administered at the end of Michelle's fourth grade at school indicated that her math skills were exceptionally well developed and were more than two years ahead of her grade 4 placement (See Table 1). However, her reading and punctuation scores were significantly lower, and were approximately 1 1/2 years behind her current grade placement.

Michelle was identified by school officials as gifted/Ld on the basis of her high performance IQ scores combined with her below average scores on the yearly CTBS achievement tests and low classroom performance on all reading and writing aspects of the curriculum. Michelle's current teachers reported that she is a shy student who does not like to take risks and who rarely participates in classroom discussions. They also indicated that Michelle appeared to work at an extremely slow pace, and they described her as spending a great deal of time "daydreaming" and thinking about what she was supposed to be doing. She appears to lose interest in academic activities quickly and never seems to get the assigned tasks completed. However, despite these difficulties, teachers reported that Michelle participated actively in all activities involving art and that she appears to be highly motivated if an academic task involved an artistic endeavor. At the time of the study, Michelle was participating in an individual enrichment program for two periods per week, to challenge her in mathematics and problem solving areas.

Diagnostic Reading Assessment

Michelle's scores on the Woodcock Reading Mastery Tests-Revised ranged from grade 3-4 in passage comprehension to grade 4-7 in word comprehension (See Table 9). An assessment of the results indicated that Michelle also had difficulty with word attack and word identification skills. She was able to identify individual consonant sounds. However, she experienced difficulty identifying many consonant blends, long and short vowels and vowel diagraphs. Although Michelle's phonetic skills were not strong, she primarily used a phonetic or "sounding out" approach to decode words. As a result, her word recognition errors were usually nonsense words (eg. "mensic" for "mechanic" or "trop" for "torpedo"). Michelle's word comprehension skills were better developed than her comprehension of passages read silently.

Table 9

Michelle's Scores on the Woodcock Reading Mastery Tests-Revised

Subtests	Grade Equivalent	Standard Score *
Word Identification	3-8	81
Word Attack	3-7	83
Word Comprehension	4-7	93
Passage Comprehension	3-4	84
Total Reading Score **	3-5	86

* The standard score has a M = 100, SD = 15.
** Total Reading score was based on Word Identification and Passage Comprehension scores.

Michelle's instructional level in word recognition and oral reading comprehension on the Burns and Roe Informal Reading Inventory were at a late grade 3 to early grade 4 level, and corresponded to her scores on the Woodcock Reading Mastery Tests-Revised (See Table 10). During oral reading tasks on the test, it was observed that Michelle frequently skipped words, parts of words, and phrases when reading. She also made numerous substitution errors in the middle of words (eg. "lives" for "leaves" and "set" for "swept"). In oral reading comprehension, Michelle was unable to identify the main ideas in any paragraphs and had difficulty defining vocabulary words from the passage she just read.

Table 10

Michelle's Scores on the Burns-Roe Informal Reading Inventory

Passage Level	Word Recognition	Oral Reading Comprehension
3	99% Independent Level	75% Instructional Level
4	95% Instructional Level	80% Instructional Level
5	85% Frustration Level	50% Frustration Level

Metacognitive Questionnaire

Michelle's total score on the IRA was moderately high and indicates that she ~~is~~ aware of many of the important person, task and strategy variables essential to reading

(See Table 11 for scores on the IRA subscales). Her metacognitive awareness was greatest in the area of conditional knowledge which involves knowing when and why to use specific reading strategies. She was able to identify effective strategies that could be used to recall information when reading in science or social studies, when writing a book report and when reading just for pleasure. Michelle's responses on evaluation items suggest that she is acutely aware of the basic structural features of the text, such as the importance of the first and last sentences, and that the most complex part of reading for her is decoding or "sounding out" the words. However, Michelle was unable to identify which sentences were the most important ones in the text as she felt that all of the sentences were important.

Table 11

Michelle's Scores on the Index of Reading Awareness

Scales on IRA	Score on IRA	Percentage Correct
Total Score	27/40	70
Evaluation	7/10	70
Planning	6/10	60
Regulation	6/10	60
Conditional Knowledge	9/10	90

Her metacognitive knowledge about planning and regulation strategies was weaker than her awareness of conditional knowledge and evaluation strategies. In terms of planning strategies, Michelle indicated that planning before reading was not necessary. She also did not appear to be aware of the benefits of using skimming strategies and stated that the best way to remember the meaning of a story was to "read all of the story and try to remember everything." Michelle's responses to the regulation items suggest that she is able to identify the types of reading materials that can be read most rapidly. She also is aware that the context of the sentence may be used to identify unknown words when reading. However, when an entire sentence was not understood, Michelle suggested that "rereading the sentence several times" would be more helpful than using the context of the passage for clues. Additionally, on a question that asked why rereading the text was important, she responded that "it was good practice" to use a rereading strategy to assist in comprehension. This answer suggests that although she is cognizant of the existence of the rereading strategy, she does not appear to be aware of when to use the strategy and why this strategy may be useful when reading. Consequently this lack of metacognitive knowledge may lead to the faulty utilization of the strategy.

In summary, Michelle appeares to be knowledgeable about many of the basic text features such as the importance of the first and last sentence in a passage and the importance of changing the rate of reading with different types of

Dtext. She also seems to be aware of when and why to use specific strategies to enhance reading comprehension. However, Michelle's responses on the IRA suggest that she does not fully recognize the importance of reading for a purpose and planning prior to commencing a reading activity. Further, Michelle does not seem to realize that an essential goal in reading is to identify the main idea rather than attempting to remember the entire story or all of the details.

Think Aloud Error Detection Task

On the think aloud passages, Michelle identified 50% of the errors embedded in the passages and an equal number of phrase and word errors (See Table 12 for Michelle's error detection results). Although the metacognitive interview indicated that Michelle was knowledgable about the importance of using evaluation strategies when reading, an appraisal of Michelle's performance on the error detection task indicated that her monitoring skills were weak. She failed to recognize half of the word and phrase inconsistencies inserted into the passages.

However, an analysis of Michelle's verbal protocol from the think aloud passages provided several clues as to why Michelle missed detecting numerous errors. A review of the word errors indicates that Michelle did not identify or

Table 12

Errors Identified on the Think Aloud Error Detection Task.

Passage 1	Michelle	Bobby	Andrew
Words:			
- growling			
- male	X	X	X
- biting		X	X
Phrases:			
- to ever you have	X	X	X
- does not have water			
- the two final for		X	
Passage 2			
Words:			
- high	X		X
- swimmers			X
- sleeping	X	X	X
Phrases:			
- Require walking does not			X
- you all is need	X		X
- up and slowly build	X		X

underline the words "swimmers," "growling," and "biting," as errors because she spontaneously attempted to incorporate these words into the passage by inferring what the author wrote. For example, when reading a passage describing mosquitoes, she read the sentence "The growling keeps you awake." Because she could not relate this concept to what she was reading about mosquitoes, she logically inferred that other animals must be in the room with the author. Michelle made similar inferences about the two other word errors embedded in the text and as a result also did not identify them as errors. Instead of trying to relate these inconsistencies to other ideas presented earlier or later in the passage, she made reasonable inferences based on her own background knowledge. However, what became evident in reviewing the phrase errors was that Michelle did not revise any faulty inferences or assumptions that she made when information read later in the text suggested that they were wrong. Therefore, Michelle appears to initially monitor her comprehension when reading but does not later check to see if the strategies she employed were appropriate.

Table 13 displays the frequencies and percentages of seven categories of reading statements identified in Michelle's reading protocols. For ease of interpretation, the statements were rank ordered from greatest to least reported. Evaluation, paraphrase and regulation statements were reported most frequently and together comprised 75% of the strategies transcribed.

Table 13

Frequency of Reading Strategies Identified on Michelle's Think Aloud Protocols

Strategies	Passage 1		Passage 2		Total	
	#	%	#	%	#	%
Evaluation	5	28	11	30	16	30
Paraphrase	7	39	8	22	15	28
Regulation	1	5	8	22	9	17
Expansion	2	11	4	11	6	11
Inference	2	11	2	6	4	7
Synthesis	0	0	2	6	2	4
Planning	1	5	1	3	2	4
Repetition	0	0	0	0	0	0
Opinion	0	0	0	0	0	0
Miscellaneous	0	0	0	0	0	0
Total	18	99*	36	100*	54	101*

# Number of strategies reported
% Percentage of strategies reported on protocol
* Percentages may not add to 100% due to rounding

The evaluation strategy, which involved assessing task demands, personal knowledge, personal reading performance, and resources available, was noted most frequently on the think aloud protocols. Evaluation strategies predominantly consisted of statements indicating whether Michelle understood the sentence and included statements such as "this doesn't make sense" or "I don't think this word 'sleeping' should be here."

Paraphrasing strategies were also frequently reported Dand made up 28% of the strategies transcribed. Michelle's paraphrase statements often consisted of a short summary of the sentence presented. These summaries occurred after almost every sentence in the passages, and the ideas from the sentences were usually clearly and precisely expressed in Michelle's own words. The following examples illustrate some paraphrasing strategies used by Michelle. The portion of the text that was read by the student appears in capital letters, and Michelle's statements appear in lowercase letters.

> THE EGG STAGE LASTS SEVERAL DAYS AND IS FOLLOWED BY A SEVEN-DAY LARVAE STAGE.
>
> M: There are two stages of mosquitoes: the egg and larvae stage.
>
> WALK QUICKLY - IT IS GOOD FOR YOUR HEART AS WELL AS FOR OTHER MUSCLES OF YOUR BODY.
>
> M: Walking is a good way to keep fit.

Two different types of **regulation** statements were also reported by Michelle throughout the reading passages and they were usually located following an evaluation statement. One of the first regulation statements mentioned by Michelle when attempting to comprehend a sentence with an error embedded within, was a visual imagery strategy. This strategy was reported after reading the following sentence:

> BUT TO EVER YOU HAVE TRIED TO SLEEP WITH A LITTLE MOSQUITO BUZZING AROUND?
>
> M: ...I'm picturing a mosquito buzzing around.

Prior to using this strategy, Michelle indicated that she did not understand the sentence. She stated plans to reread the sentence, reread the sentence and then noted the specific error. The use of a visual strategy suggests that Michelle uses her strong visual reasoning skills to assist her in comprehending what she is reading. Although the visualizing strategy was only verbalized at the beginning of a passage when Michelle was hesitant and slightly apprehensive when confronted with a comprehension problem, it is possible that she uses this strategy automatically and unconsciously while reading.

The second type of regulating statement reported was a rereading strategy, in which Michelle reread the passage in an attempt to comprehend what she was reading. The majority of regulating statements noted by Michelle were rereading strategies and a sample of this strategy from Michelle's protocol is as follows:

> THE EXERCISE THAT IS AVAILABLE TO NEARLY EVERYONE, AND ONE THAT EVERYBODY CAN AFFORD IS WALKING.
>
> M: I had to reread the sentence twice to understand what it was about.

When using the rereading strategy to regulate her own comprehension, Michelle appeared to read the sentence initially concentrating on decoding difficult words. Then she reread the sentence as a whole to understand its meaning.

Michelle also used four other reading strategies to assist her in comprehending what she was reading. She used **expansion** statements in which she associated information from her own personal experience with what she was reading. For example,

> WALKING IS AN EXERCISE AVAILABLE TO RICH AND POOR, TALL AND SHORT, FAT OR THIN, YOUNG AND OLD.
>
> M: Everyone can walk for exercise, even people like my grandmother.

She also made **inferences** to fill in information that was not explicitly stated by the text. For example, after reading the phrase "The growling keeps you awake," in a passage about mosquitoes, Michelle interpreted it to mean that there are not only the mosquitoes bothering the person, but also other animal noises keeping the person from sleeping. She thus assumed that the growling in the room came from animals.

Although **synthesis** statements were not frequently noted in the protocol, one was used approximately half-way through and at the conclusion of the paragraph on walking, to regulate her understanding of the passage. **Planning** statements were also reported infrequently as they appeared only once in each passage. They included statements such as "I will reread it again in case I missed a word," and indicated that Michelle had identified and selected a strategy to subsequently use to assist her in understanding what she is reading.

Overall, an analysis of Michelle's verbal protocols indicates that she appears to use a variety of strategies when reading and is actively appraising and monitoring her comprehension when reading. Evaluation and paraphrase statements were used most frequently on the think aloud task and indicated that she attempted to rephrase the information into her own words as she was reading. She also appeared to evaluate frequently whether or not she was comprehending what she was reading. When Michelle was confronted with a comprehension problem, the think aloud protocols indicated that she used two different techniques to solve the problem. These techniques included visualizing what she was reading in order to comprehend the text, and rereading a phrase or sentence to clarify what was read. Michelle also appeared to elaborate upon what she was reading by providing background information from her own personal experience to assist her in decoding and comprehending the text. Additionally, synthesis statements were also apparent when Michelle attempted to combine some ideas presented in the passage.

However, although Michelle appeared to use a variety of strategies when reading, she did not seem to revise or abandon the strategies such as inference or expansion statements, when the information presented later in the text conflicted with her hypotheses. Therefore, Michelle adequately evaluated and recognized when she did not understand something, and she appeared to use her background information and strong reasoning skills in an attempt to comprehend the text. However, a breakdown in the comprehension process seemed to occur when Michelle continued reading and did not notice or was unconcerned that the later information she read conflicted with earlier inference, synthesis, and expansion statements.

Summary

Michelle is a grade 5 student who was identified as gifted/Ld on the basis of her superior visual reasoning skills on the WISC-R and her below average performance in reading and writing both in the classroom and on a standardized achievement test. A closer analysis of Michelle's reading skills indicates that her phonics skills are inadequately developed and that she skips many words and phrases when reading. As a result is unable to comprehend the main idea in a reading passage.

The metacognitive reading assessments indicated that Michelle was aware of a wide variety of reading strategies and used a number of them when reading. She was keenly aware of the importance of evaluating person, task and strategy variables when reading, and evaluation strategies were reported most frequently on the protocols. However, Michelle appeared to have limited knowledge about the importance or purpose of using planning strategies. Observation of Michelle's actual use of reading strategies on the think aloud task indicated that she regulated her comprehension on the passages through the use of visualizing, rereading, elaboration and synthesizing strategies. However, few planning statements were recorded on the think aloud error detection task and she did not appear to review or amend a strategy when it was used inappropriately or did not enhance comprehension.

Case Study 2 - Andrew

Personal and Educational Background Information

Andrew is a 10-year, 8-month old grade 5 student who is currently placed in a half-day intensive resource room program for language arts, math and social studies. He is the youngest child in a family of four, and both of his parents are Italian immigrants who have been living in Canada for about 15 years. Andrew's parents speak English fluently and English is the dominant language spoken at home. Andrew attends Italian Language School on Saturday mornings and says that he enjoys learning to speak another language. His parents appear to be deeply concerned about the problems that he is exhibiting at school and seem to be very supportive and willing to assist him at home.

Andrew's academic difficulties became apparent ~~in gr~~ade 2 when his teachers recommended that he repeat the year. Although Andrew's reading and writing skills were extremely weak, he did not repeat grade 2 because he was achieving well above his grade level in both math and vocabulary skills, as measured by a year-end standardized achievement test. Andrew received assistance for several periods a week in reading and writing skills during grades 3 and 4 and also attended summer school. He appeared to have tremendous difficulties in phonics and sequencing sound units, and his oral reading was described in progress reports as "extremely slow and choppy" with "poor phrasing and many repetitions." He made minimal progress in reading and writing despite the special program assistance he was receiving.

Andrew's confidence also diminished during his early years at school. His teachers indicated that Andrew frequently refused to read orally and became very moody and easily frustrated when he was unable to do something. However, his current classroom teacher noted that although he seemed to "daydream" in class, he was able to compute complex mathematical problems and computations in his head, and his oral responses suggest that he has a strong ability to think abstractly. However, Andrew's special interest in drawing and superior drawing skills are most apparent, both at home and at school. He appears to be fascinated with sketching and has taken a special interest in drawing black and white pictures of dinosaurs, monsters and figures from Greek Mythology. Not only does he make detailed illustrations of these creatures, but he also enjoys enlarging one aspect of the creature, such as a foot or ear, and drawing detailed diagrams of the enlarged portion.

Table 14

Andrew's WISC-R Subtest Profile (April, 1990)

Verbal Subtests	Scaled Scores	Performance Subtests	Scaled Scores
Information	8	Picture Completion	15
Similarities	16	Picture Arrangement	15
Arithmetic	13	Block Design	13
Vocabulary	13	Object Assembly	15
Comprehension	--*	Coding	13
Digit Span	8		
Verbal IQ	115	Performance IQ	130
	Full Scale IQ	125	

* Score was not available

Andrew was administered the WISC-R near the end of his grade 4 year, and the results place Andrew in the superior range of intellectual functioning (See Table 14). His nonverbal subtests were all in the high average to superior range of ability as were most of his verbal subtests. However, low average scores were found in the area of short term auditory memory for nonmeaningful information and long term memory of basic information facts.

Andrew's CTBS scores administered at the end of grade 4 indicated that his math and vocabulary skills were approximately at grade level, whereas his reading and punctuation skills were about 1 1/2 years below his current grade level (See Table 1). These scores were used as part of the initial screening of subjects for the study.

Diagnostic Reading Assessment

Andrew's scores on the Woodcock Reading Mastery Tests-Revised indicate that his skills in reading ranged from grade 2-3 to 4-8 and that he has difficulty with both word recognition and reading comprehension skills (See Table 15). He appears to reverse the order of letters in words and also reverses some individual letters (eg. p/b, b/d). Andrew did not sound out unknown words but rather looked at the configuration of the word and guessed using the initial consonant as a guide (eg. "wondered" for "wounded", "valley" for "vehicle"). His comprehension of individual words was significantly more advanced than his comprehension of reading passages.

Table 15

Andrew's Scores on the Woodcock Reading Mastery Tests-Revised

Subtests	Grade Equivalent	Standard Score *
Word Identification	4-0	85
Word Attack	2-3	79
Word Comprehension	4-8	94
Passage Comprehension	3-9	86
Total Reading Score	3-6	83

* The standard score has a M = 100, SD = 15.
** The Total Reading score was based on Word Recognition and Passage Comprehension scores.

Andrew also demonstrated below average reading skills on the Burns-Roe Informal Reading Inventory (See Table 16). His instructional level for word recognition and oral reading comprehension were grade 4 and grade 3 respectively. On oral reading tasks, Andrew read very slowly often repeating each word twice before moving on to the next word. When reading, he made numerous substitutions which at times made sense (eg. "teeny" for "tiny"), but he made little effort to monitor or correct the substitutions that were errors (eg. "was" for "and"). Andrew also had difficulty identifying the main idea in passages and was unable to recall what he had just finished reading.

Table 16

Andrew's Scores on the Burns-Roe Informal Reading Inventory

Passage Level	Word Recognition	Oral Reading Comprehension
3	99% Independent Level	90% Instructional Level
4	95% Instructional Level	70% Frustration Level
5	85% Frustration Level	50% Frustration Level

Metacognitive Questionnaire

Andrew's total score and subscale scores on the IRA can be seen in Table 17. The results from the metacognitive interview indicate that Andrew is aware of various person, task and strategy variables essential to reading. Andrew's greatest strength appears to be in his awareness of evaluation strategies. He was knowledgeable about which sentences are the most important ones in a story and could identify the role of the first and last sentences of a narrative passage. Andrew also indicated that the hardest part about reading for him was "sounding out the hard words" and noted that checking for understanding would help students become better readers.

High scores on the conditional knowledge subscale suggest that Andrew is astutely aware of when and why to use specific reading strategies. He indicated that the best method to use when reading for pleasure would be to "imagine the story like a movie in your mind." He seemed to be aware that writing information down in his own words was a useful strategy to help remember what was just read. However, when asked about reading in a specific subject area like science, social studies or when reading for a test, Andrew indicated that the best way to learn and remember what is being read is by reading the passages as many times as possible and concentrating to recall what was just read.

Table 17

Andrew's Scores on the Index of Reading Awareness

Scale	Score on IRA	Percentage Correct
Total Score	26/40	65
Evaluation	9/10	90
Planning	4/10	40
Regulation	5/10	50
Conditional Knowledge	8/10	80

Andrew's scores on the regulation and planning subscales were significantly weaker than any other section of the metacognitive interview. He was aware of two strategies that may be used to monitor reading progress: using context clues to identify unknown words and rereading a sentence or passage that is difficult to understand. However, he did not recognize the importance of monitoring or changing his rate of reading according to passage difficulty, and noted that when reading one should never skip any parts of a story.

Andrew's knowledge of planning strategies and the importance of selecting a specific reading strategy to achieve a specific goal or purpose in reading was minimal. When asked what kinds of plans he made before reading, he indicated that "you don't make any plans. You just start reading." Further, in response to the item about how he would read a story to remember the general meaning, Andrew selected the answer "read all the story and try to remember everything."

In reviewing the information obtained from this metacognitive questionnaire, several elements became apparent. First, Andrew appears to be aware that the major purpose or goal in reading is understanding, and he was astutely aware of the importance of evaluating the person, task and strategy variables. He was also able to identify efficient strategies to use at the word, sentence and paragraph level when he did not adequately comprehend what he was reading. However, Andrew did not appear to understand the importance of identifying a purpose and planning before reading. He also had difficulty understanding the need to adjust the rate of reading for different reading tasks and purposes.

Think Aloud Error Detection Task

A review of the frequency of errors observed on the error detection task shows Andrew's monitoring skills to be extremely inconsistent (See Table 12). In Passage Two Andrew detected all the errors inserted by the researcher, however on the first passage, he identified only 50% of the errors. Analysis of Andrew's statements on the think aloud protocols indicated that on the sentences where Andrew failed to recognize the errors, he just paraphrased the information he read and then moved on.

Andrew's verbal protocols from the think aloud passages indicated that he used a variety of strategies when reading the passages presented to him (See Table 18). Evaluation and paraphrase statements were the most common statements recorded in Andrew's think aloud protocols and together comprised 74% of the strategies transcribed. Evaluation statements, which included a reader's assessment of his or her current state of understanding, were reported most frequently in Andrew's protocols. The evaluation statements indicated that Andrew was closely monitoring his reading and was often consciously aware of not knowing the meaning of a word or passage. Several examples of evaluation statements from Andrew's protocols are as follows:

> LATELY, MORE PEOPLE ARE EXERCISING THAN EVER BEFORE.
>
> A: It makes sense. More people are exercising than ever.

Table 18

Frequency of Reading Strategies Identified on

Andrew's Think Aloud Protocols

Strategies	Passage 1		Passage 2		Total	
	#	%	#	%	#	%
Evaluation	15	47	15	40	30	44
Paraphrase	10	31	11	30	21	30
Regulation	4	13	3	8	7	11
Planning	2	6	3	8	5	7
Repetition	0	0	4	11	4	6
Inference	1	3	0	0	1	1
Miscellaneous	0	0	1	3	1	1
Synthesis	0	0	0	0	0	0
Expansion	0	0	0	0	0	0
Opinion	0	0	0	0	0	0
Total:	32	100*	37	100*	69	100*

# Number of strategies reported
% Percentage of Strategies reported on protocol
* Percentages may not add to 100% due to rounding

WALKING IS AN EXERCISE AVAILABLE TO RICH AND POOR, TALL AND SHORT, FAT OR THIN, YOUNG AND OLD.

A: It doesn't make sense. I will reread it again to see if I know what it's talking about. Oh, it makes sense...

STRANGE AS IT MAY SEEM, MOSQUITOES ARE MORE ATTRACTED TO DARKER SKINNED PEOPLE THAN THEY ARE TO THOSE WITH LIGHT SKIN.

A: It makes sense. Mosquitoes are more active in the dark.

In the first example, Andrew made a statement indicating that he understood what he read, and then he paraphrased what was in the sentence he read. This was a common procedure that Andrew used when he understood what he was reading.

In the second example, Andrew indicates that he does not understand what he is reading. When Andrew did not comprehend a passage either because of difficulty in decoding or comprehension, he usually reread the sentence a second time. Often after rereading the phrase, he was able to understand the sentence and would continue reading the remaining passage. The third example illustrates Andrew's inaccurate evaluation of his reading performance. It appears from the example that Andrew had difficulty decoding the word "attracted" and instead substituted the word "active" which did not really fit into the passage. After reading the sentence, he stated that he understood it. However, when he subsequently paraphrased the sentence, he rephrased and interpreted the information incorrectly.

Therefore, although the majority of the statements made by Andrew were evaluation statements, he did not always evaluate his own reading performance correctly because of errors in decoding.

The second most frequent statement observed in Andrew's protocols, was the **paraphrase** statement. This strategy consisted of short summaries of a small portion of the information presented in the sentence and usually made little reference to any other details presented earlier in the reading passage. The following is an example:

> THE EGG STAGE LASTS SEVERAL DAYS AND IS FOLLOWED BY A SEVEN-DAY LARVAE STAGE.
>
> A: ...It's talking about the stage of the um ... mosquito.

Additionally, the paraphrase statements frequently were observed following an evaluation statement which indicated whether Andrew was able to comprehend the passage. When paraphrasing, Andrew also frequently repeated phrases and words directly from the text as illustrated in the following example:

> YOU CAN WEAR JEANS, SHORTS, SWEAT PANTS OR WHATEVER YOU WISH.
>
> A: You should wear um ... jeans, shorts, sweat pants.

Regulation strategies were occasionally reported and comprised approximately 11% of the strategies transcribed. All of the regulation statements were preceded or followed immediately by evaluation statements, and the regulation strategies consistently entailed rereading the sentence. The following example illustrates Andrew's use of a regulation statement:

> THE EGG STAGE LASTS SEVERAL DAYS AND IS FOLLOWED BY A SEVEN-DAY LARVAE STAGE.
>
> A: It doesn't make sense. I reread the line, oh it does, its okay.

Planning and inference statements were rarely found in the think aloud reading protocols. No planning statements were apparent at the beginning of the reading passages and most of the planning statements made by Andrew related to preparations for rereading a sentence because of a comprehension difficulty. An illustration of a planning strategy in the protocols occurred when Andrew read a lengthy sentence and stated, "I will reread it again to be sure that I understand it."

Additionally, Andrew made only one inference statement while reading the passages. When Andrew read the sentence in the mosquito passage stating "The growling keeps you awake," he seemed to realize that the details did not fit in with the information read earlier in the paragraph. Instead of underlining the word "growling" to indicate an error in the sentence, he inferred that the growling keeping the author awake at night was coming from the author's stomach. Although this inference statement appears to be quite plausible and creative in relation to the sentence Andrew read, it is not a very logical response when one reviews the information presented in the preceding and following sentences. Analyzing Andrew's use of an inference statement in the protocol indicates that Andrew does not combine and synthesize information from a number of sentences when reading. Instead, he seems to treat each sentence as an independent unit of information. Furthermore, synthesizing strategies were noticeably absent from Andrew's protocols, and thus there was no evidence that Andrew combined two or more units of information from the text to form a main idea or theme.

Overall, the results on the error detection task indicate that Andrew is relatively proficient in detecting errors inserted in the text, which suggests that he actively monitors his own reading when he is provided with a specific goal or purpose before reading. The think aloud protocols revealed that Andrew was acutely aware of his own reading comprehension and evaluated his own performance after each sentence read. After each passage, Andrew frequently paraphrased what he read to assist him in monitoring his own reading. However, Andrew did not always decode the text correctly, and as a result, he often assumed that he understood the meaning of the text when in fact he did not. Further, when evaluating his own reading progress and concluding that he did not understand the text, Andrew reported the use of very few different strategies to solve comprehension difficulties. One of the strategies most frequently reported when Andrew was confronted with a word recognition or comprehension problem was rereading the sentence. He almost always used this rereading strategy to regulate his reading, and he also reported using rereading as part of a planning strategy. However, if after rereading the sentence Andrew still failed to comprehend it, he would just move on and continue reading the next line in the text. Consequently, when the rereading strategy failed to work in a situation, Andrew did not appear to use any other strategy to repair his comprehension errors.

Summary

Andrew is a grade 5 student who exhibits strong visual and verbal reasoning abilities and exceptional artistic abilities in drawing, while at the same time experiencing extreme difficulties in reading and writing tasks. Diagnostic reading tests indicate that Andrew has problems with word attack skills and primarily used the visual configuration of a word when identifying unknown words. On oral reading tasks, Andrew substituted many words in the passages with other words and consequently, had difficulty comprehending what he was reading.

The metacognitive reading assessment indicated that Andrew was aware of how and why to use a wide variety of reading strategies. However, his use of these strategies appeared to be limited on the think aloud reading activity.

Paraphrasing and evaluation strategies were reported throughout the think aloud passages. However, Andrew's faulty decoding skills often interfered with his self-evaluation and monitoring skills and frequently led to Andrew's inaccurate evaluation of his own performance. When monitoring his understanding of what he was reading, Andrew relied heavily on a "rereading strategy" to repair his comprehension problems. He also failed to monitor the strategies he selected to see if they actually assisted him in comprehending what he was reading.

Case Study # 3 - Bobby

Personal and Educational Background Information

Bobby was 11-years, 11-months of age and in grade 6 at the time of the data collection. He is the youngest child in a family of five and has two older brothers, one in grade 4 and the other in grade 7. Bobby's difficulties in school did not become apparent until half-way through grade 3 when comments on his report cards indicated that he had trouble comprehending what he was reading. In grades 4 and 5, Bobby's teachers described him as verbally articulate but indicated that in addition to his difficulty in reading comprehension, he was experiencing problems in organizing and expressing himself on written assignments. Teachers also noted that he began exhibiting attention seeking behavior such as talking out loud in the classroom and becoming the class clown.

Table 19

Bobby's WISC-R Subtest Profile (January, 1990)

Verbal Subtests	Scaled Scores	Performance Subtests	Scaled Scores
Information	14	Picture Completion	10
Similarities	18	Picture Arrangement	11
Arithmetic	12	Block Design	12
Vocabulary	12	Object Assembly	--*
Comprehension	15	Coding	9
Digit Span	--*		
Verbal IQ	125	Performance IQ	104
	Full Scale IQ	118	

* Scores were not available.

Bobby was referred for an intellectual assessment because of his poor behavior in class and inadequate classroom performance on reading and writing activities. His overall IQ score on the WISC-R was in the high average range. However, there was a 21 point difference between his verbal and performance scales (See Table 19). The results indicated that Bobby has superior verbal reasoning abilities, although his visual reasoning skills were significantly less developed and fell within the average range of ability.

Achievement tests administered at the end of grade 5 indicated that Bobby's skills in math computations and vocabulary were parallel to his grade (See Table 1). However, his skills in reading and punctuation were approximately 1 1/2 years below grade level.

Diagnostic Reading Assessment

Bobby's scores on the Woodcock Reading Mastery Tests-Revised were widely dispersed ranging from grade 3-2 in Word Attack to grade 6-1 in Word Identification (See Table 20).

Table 20

Bobby's Scores on the Woodcock Reading Mastery Tests-Revised

Subtests	Grade Equivalent	Standard Score *
Word Identification	6-1	98
Word Attack	3-2	87
Word Comprehension	4-6	89
Passage Comprehension	4-6	89
Total Reading Score **	4-4	87

* The standard score has a M = 100, SD = 15.
** The Total Reading Score is based on Word Identification and Passage Comprehension scores.

His Word and Passage Comprehension scores were approximately 2 years below grade level. Bobby's performance on the test indicates that he appears to recall most words by sight. He had difficulty identifying nonsense words on the word attack subtest, and an analysis of his errors indicated that his difficulties seem to be primarily in differentiating between long and short vowel sounds.

On the Burns-Roe Informal Reading Inventory, Bobby's instructional level in word recognition was approximately at the grade 6 level and at the mid grade 3 level in reading comprehension (See Table 21). When reading out loud on the test, Bobby often omitted articles and prepositions in the sentences (eg. a, as, for, the). He also appeared to have difficulty sounding out unknown words and he seemed to recognize most words by sight. In reading comprehension, Bobby experienced most difficulty understanding the main ideas in the reading passages, and he had problems making inferences and defining vocabulary words. He seemed astutely aware of the details in the passages and had little difficulty recalling the sequence of events in a story.

Table 21

Bobby's Scores on the Burns-Roe Informal Reading Inventory

Passage Level	Word Recognition		Oral Reading Comprehension	
3	98%	Independent Level	80%	Instructional Level
4	95%	Independent Level	70%	Frustration Level
5	95%	Independent Level	30%	Frustration Level
6	91%	Instructional Level	20%	Frustration Level

Metacognitive Questionnaire

Bobby's total score on the IRA suggests that he lacks knowledge of many of the important aspects of reading (Refer to Table 22 for IRA scores). His metacognitive awareness was greatest in the area of conditional knowledge which suggests that he is keenly aware of when to use reading strategies and why the strategies are important. His responses to items asking what would be the best way to remember information from a story or from a science or social studies text suggest that he is aware of several optional strategies and that he is able to accurately identify the strategy most useful in a particular reading context. However, Bobby did not appear to be knowledgeable about the strategies that could be used when reading for an exam or for pleasure. For example, when he was asked what would help him most when he was reading for a test, he selected the response which stated "Read the story as many times as possible."

A lower score on the regulation subscale of the IRA indicated that Bobby was not aware of the importance of monitoring his own reading. He did identify two strategies that could be used to monitor his reading progress: using the context surrounding the word to identify an unknown word, and increasing one's rate of reading when the story has been read previously. However, difficulties arose when Bobby was asked "Why should you go back and read things over again?" From Bobby's response, which indicated that the rereading strategy is used when you forget the exact words, it seems apparent that he is unaware of the function of the rereading strategy in monitoring his reading.

Table 22

Bobby's Scores on The Index of Reading Awareness

Scales	Score on IRA	Percentage Correct
Total IRA	26/40	62.5
Evaluation	6/10	60
Planning	6/10	60
Regulation	5/10	50
Conditional Knowledge	8/10	80

Perhaps one of the most significant findings in the metacognitive interview was on an evaluation item which asked, "What is the hardest part about reading for you?" Bobby picked the response which stated "nothing is hard about reading for you," which suggests that despite Bobby's inadequate reading achievement and the difficulties he has in comprehending what he reads, he may not be aware or may not be willing to admit to himself that he has poor reading skills. Faulty or inadequate knowledge of his own reading ability may influence the types of strategies he uses when planning or regulating his reading comprehension. Further analysis of the evaluation items suggest that Bobby was knowledgeable about the importance of task variables such as the significance of the first and last sentences in a passage. However, he could not evaluate which sentences were the most important ones in a story.

Bobby's knowledge of planning strategies was also limited. When asked about what preparations he makes before reading, he chose a response indicating that "you don't make any plans. You just start reading." On a question that asked what he would tell other people after he had read a story, Bobby reported that he would usually just relate the number of pages that were in the book. This response suggests that his focus appears to be more on the elements of the reading task itself rather than on the meaning of the passage. He did however, recognize that a skimming strategy could be used to assist the reader in finding and recalling the main parts of a story.

Overall, Bobby's responses on the metacognitive interview suggested that he is keenly aware of when to use specific reading strategies and why they might be important. He recognizes the importance of the first and last sentences, of skimming for main ideas in a passage, and of reading and using the context to help identify unknown words. However, Bobby's awareness of evaluation, planning and regulation strategies is significantly weaker. He indicated on the IRA that nothing was difficult about reading for him and that planning before reading was not necessary. He did not appear to be aware of the purpose of reading sentences or the purpose of using the rereading strategy when studying for a test.

Think Aloud Error Detection Task

Like many learning disabled students, Bobby did not seem adept at cognitive self-appraisal. On the think aloud passages, Bobby only identified 50% of the embedded word errors and 33% of the errors in the phrases (See Table 12). An analysis of Bobby's verbal protocol from the think aloud passages revealed that Bobby used a variety of strategies while reading. The frequencies and percentages of the eight types of reading strategies reported by Bobby can be found in Table 23.

An examination of Bobby's protocols indicated that evaluation and paraphrase statements were reported most frequently. Together, these two strategies comprised approximately 68% of the total strategies transcribed. Evaluation statements were used the most regularly in Bobby's think aloud protocols, which suggests that Bobby was monitoring his reading performance. However, close analysis of the evaluation statements used indicates that a large proportion of the evaluation statements are focused on decoding aspects of reading rather than on comprehending the meaning of the text. The following passage from Bobby's protocol illustrates an evaluation statement which focuses

Table 23

Frequency of Reading Strategies Identified on Bobby's Think Aloud Protocols

Strategies	Passage 1		Passage 2		Total	
	#	%	#	%	#	%
Evaluation	8	42	12	40	20	41
Paraphrase	2	11	11	37	13	27
Regulation	3	15	1	3	4	8
Expansion	2	11	2	7	4	8
Repetition	1	5	2	7	3	6
Planning	2	11	1	3	3	6
Opinion	0	0	1	3	1	2
Miscellaneous	1	5	0	0	1	2
Synthesis	0	0	0	0	0	0
Inference	0	0	0	0	0	0
Total	19	100	30	100	49	100

# Frequency of strategies reported
% Percentage of strategy used on protocol

on the spelling of words in a sentence:

> LATELY, MORE PEOPLE ARE EXERCISING THAN EVER BEFORE.
>
> B: ...The word exercising looks to me like it is spelt wrong....

Another evaluation statement found later in his protocol indicates that Bobby is focusing his attention on reading the words correctly rather than reading for understanding. In the following example, Bobby read a sentence containing an error and responded with an evaluation statement:

> REQUIRE WALKING DOES NOT ANY EXPENSIVE EQUIPMENT, NO SPECIAL OUTFIT AND CAN BE DONE WHEREVER YOU ARE.
>
> B: It seems to all make sense to me. Isn't it if you can read it (the words), it's good? I can read all the words right so I will move on to the next line.

This evaluation statement is perhaps one of the most illuminating statements made by Bobby when reading the passages. It suggests that while Bobby may be evaluating his reading performance, his focus is on decoding the words rather than on understanding the meaning of the text and suggests that like many learning disabled readers, Bobby may consider the purpose of reading to be decoding the text.

The **paraphrasing** strategy, which involved summarizing the information in the text, was also employed frequently on the think aloud reading activity. However, these paraphrase statements frequently consisted of short summaries of a small portion of the information presented in the sentence and usually made little reference to any other details presented earlier in the reading passage. Additionally, the paraphrased information was often vague or inaccurate. The following examples illustrate imprecise and inaccurate paraphrasing statements used by Bobby:

> THE EXERCISE THAT IS AVAILABLE TO NEARLY EVERYONE, AND ONE THAT EVERYBODY CAN AFFORD IS WALKING.
>
> B: Nothing new except more about exercising.
>
> WALKING CAN BE FUN IF YOU MAKE IT SO.
>
> B: Uh - walking is good for you.

Although evaluation and paraphrasing statements indicated that Bobby was monitoring his decoding of the text, planning and regulation statements were reported infrequently. The two planning statements evident in the protocols indicated that Bobby was going to begin reading the next sentence to find out more information about the subject he was reading. Regulating statements were also reported infrequently on the think aloud protocols and indicated that he occasionally reread a sentence if he had difficulty reading a word. Again, Bobby's use of these strategies illustrates his focus on word recognition and the decoding components of reading.

Expansion and opinion statements were also evident on Bobby's protocols and indicate that he adds information from his own personal experiences to the passages. For example, after reading a sentence about being careful not to do too much exercise when first beginning an exercise program, Bobby expands on these ideas by stating, "You often hear on

TV that you shouldn't overdo it when you exercise." He also provided additional information in a personal opinion when at the conclusion of a passage about exercising he commented, "I don't like walking." Both the expansion and the opinion statements used by Bobby suggest that he was attempting to use his background knowledge on the topic of the passage to fill in information.

Two categories of reading strategies not found when analyzing Bobby's reading protocols were synthesizing and inference statements. While it is impossible to conclude that Bobby did not use any of these strategies, the think aloud reading activity suggests that Bobby did not verbalize any attempt to move beyond the information presented in the individual sentences and associate and synthesize the information from the passages into a meaningful whole.

Overall, an analysis of Bobby's statements on the think aloud passages and his results on the error detection task indicate that Bobby attends primarily to word recognition and structural aspects of the text and appears to believe that the main purpose in reading is decoding the words. Evaluation, planning and regulation statements from the think aloud protocols were also centered on word recognition. Paraphrasing statements were often vague and inaccurate and Bobby often just repeated words and phrases from the passages verbatim. There was no evidence on the protocols that Bobby developed a coherent understanding of the text. The absence of synthesizing and inferencing statements on the protocols provides further support for these conclusions. Additionally, expansion and opinion statements in the protocols suggested that Bobby tends to use prior knowledge and experience rather than using information stated directly in the text. Consequently, the meaning that he constructs from the text included many of his own elaborations and thus may be very different than the author's intended meaning.

Summary

Bobby is a grade 6 student who was identified as gifted/Ld, after being referred for psychological assessment for behavior and attention problems at school. Bobby's IQ scores indicated that his verbal reasoning ability was in the superior range and that there was a vast discrepancy between his visual and verbal reasoning skills. The majority of Bobby's academic skills on achievement tests were within the average range. However, his reading and writing achievement was significantly below grade level. Observation and analysis of Bobby's performance on the diagnostic reading tests indicates that he has difficulty decoding unknown words and relies predominantly on his strong sight vocabulary when reading.

The metacognitive reading assessment indicates that Bobby is acutely aware of when and why to use specific strategies in reading and of many specific details about evaluation, planning and regulation strategies, such as the importance of the first and last sentence in a passage. However, Bobby does not appear to be aware of the purpose of using evaluation, planning and regulation strategies, and more importantly, does not appear to be aware that the purpose of reading is to derive meaning from the text. Bobby's think aloud protocols revealed that although he was actively involved in the reading process, his attention was directed primarily to decoding each word. As a result, most of the statements coded on the protocols were decoding strategies. Bobby reported few strategies for evaluating, planning and monitoring his reading comprehension, and in an attempt to understand what he was reading, Bobby supplied information from his own background experiences.

A Comparative Analysis of the Gifted/Ld Students

In the previous section, the metacognitive knowledge and strategies used by each gifted/Ld student were outlined. The next section will compare the students' results on the IRA metacognitive interview and describe the similarities and differences between the three gifted/Ld students on the think aloud error detection task. It is imperative that caution be taken when interpreting these results as there are only three students in the sample, and although they were carefully matched on variables such as age, socioeconomic status and reading achievement, they each possess unique and individual traits and characteristics.

Several points need to be addressed in reviewing the criteria for selecting the students for the study. First, although a minimum IQ of 125 was used as one of the criteria to identify the students as gifted/Ld, the students were by no means a homogeneous group and they differed in the ways they processed information. For example, although the students' full scale IQ differed by only 7 points, there was a significant difference (26 points) between the students' scores on the subscales. As well, an examination of the IQ profiles demonstrated that there were individual differences in strengths and weaknesses among the three students. One general difference between the students was that Michelle and Andrew had superior performance IQ scores and average verbal IQ scores, whereas Bobby demonstrated the opposite profile with superior verbal and average performance IQ scores on the WISC-R.

A second difference evident in comparing these students is that although they achieved similar reading comprehension scores on the diagnostic reading assessments, they exhibited very different reading styles and reading problems. For example, Bobby had sight vocabulary skills and weak word attack and reading comprehension skills, whereas Andrew had strong word comprehension skills and very weak word attack skills and Michelle appeared to have relatively strong word comprehension skills but had weak word attack, word recognition and passage comprehension skills. Although these students differed in their word identification and reading comprehension skills, they all experienced difficulty on word attack skills.

A third distinction found in reviewing the selection criteria was that the students' "gifts" and learning problems were manifested at different periods in the children's lives and in several different forms. Michelle's difficulties became apparent at the beginning of her schooling. Michelle repeated kindergarten and then received part-time resource room programming to assist her in her areas of weakness. This program was aborted when little progress was made, and an individual enrichment program was designed to develop and challenge her in her areas of strength. Unlike Michelle, Bobby's difficulties in school did not become apparent until upper elementary when his behavior became a problem in the classroom. Bobby's special programming has included a weekly enrichment program in computers and math and a behavior program designed for use in the regular classroom. Andrew's difficulties began in grade 2. He received remedial programming daily in the resource room for two years and then was transferred into a half-time resource room program in which he is currently enrolled. All the students were referred and identified as gifted/Ld on the basis of learning or behavioral difficulties rather than for their special "gifts".

Comparison of the Students on the IRA

Analysis of the three students' total raw scores on the IRA indicates that their overall scores were similar as there was only a 3-point difference between the scores. The total IRA scores indicate that the three gifted/Ld students in the study were consciously aware of some of the important person, task and strategy variables that are essential in reading. However, a review of the scores from the four subtests indicates that there was some variability in metacognitive awareness among the students (See Figure 2).

Overall, the gifted/Ld students' scores were generally higher on the **conditional knowledge** scale which measured the readers' understanding and knowledge of when and why to use a particular strategy. Michelle and Bobby received their highest scores on this subscale, 90% and 80% respectively, and Andrew's score of 80% was his second highest score on the IRA scale. All of the students indicated that when asked to report about a book after reading, they would write the information down in their own words to help them understand and remember what they read (IRA item #19). They also seemed to be aware of when and why to use strategies when reading to recall information in science, in social studies, on a test and when reading for fun.

SUMMARY OF SCORES ON THE INDEX OF READING AWARENESS

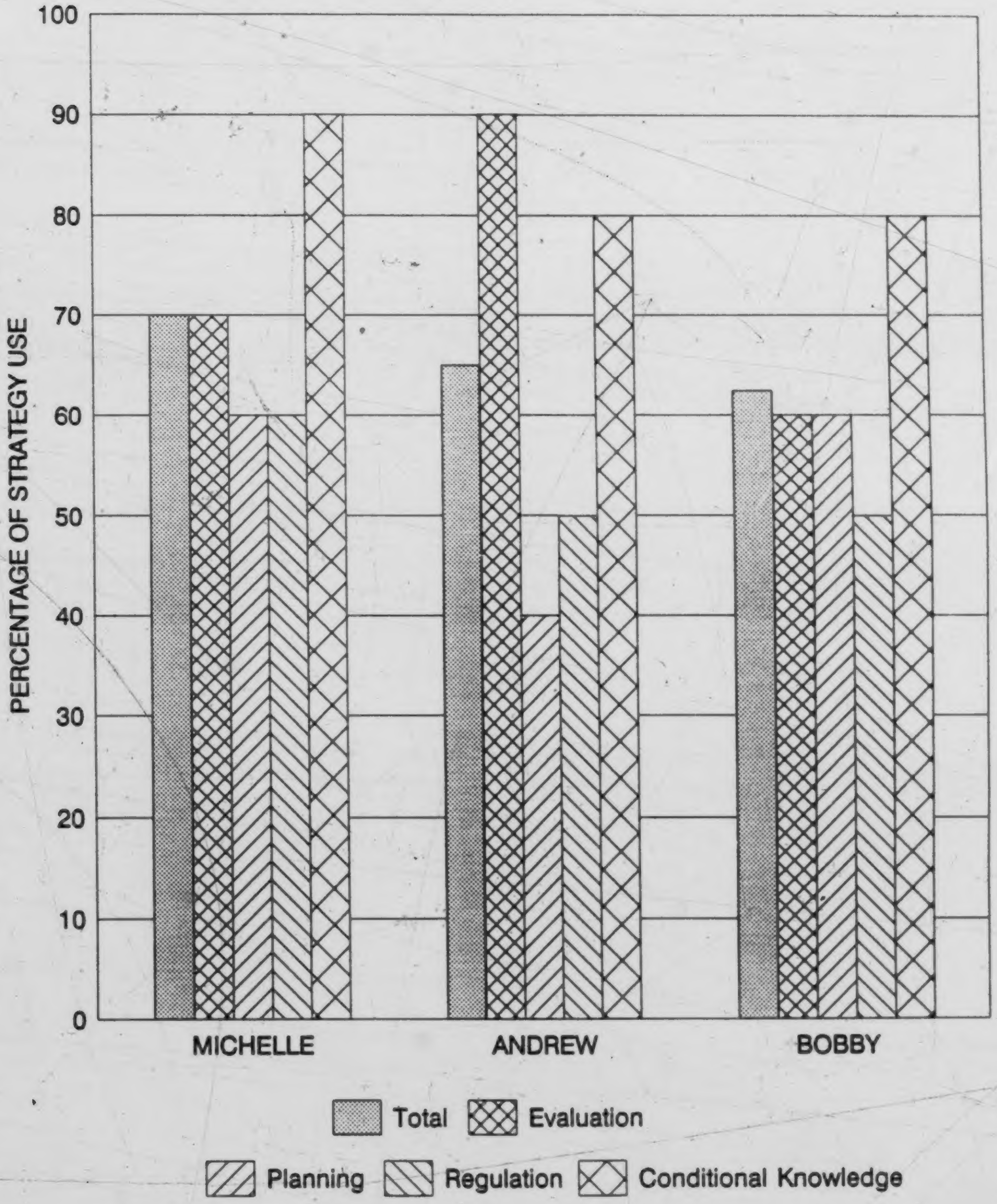


Figure 2

Interestingly, on a conditional knowledge question which asked the students what to do when reading a story for pleasure, Andrew and Michelle responded that they would "imagine the story like a movie in your mind" (Item #16, Jacobs & Paris, 1987, p. 270), whereas Bobby responded that he would acquire the meaning of the story from the pictures. The two students who demonstrated superior performance scores on the WISC-R and who are strong visual learners selected the most appropriate strategy. However Bobby, who has stronger verbal skills, selected a less strategic response, thus exemplifying that his awareness and knowledge in this area were less developed.

Michelle's and Andrew's lowest scores were on the planning subscale of the IRA, which measured the selection of a particular reading strategy to achieve a particular goal in reading. None of these students seemed to be aware of the importance of using planning strategies when reading. On a question asking students what types of plans they would make before they began reading (IRA item #9), all three students responded that a reader should just begin reading and that it was not necessary to make plans before reading. Possibly the students' lack of knowledge about planning and setting a purpose before reading may have been one of the reasons that they exhibited difficulties in comprehending what they read.

The students' metacognitive awareness of regulation strategies as measured on the IRA was also relatively weak, as the mean score of the three students on this subscale was M = 53.3 %. The three students selected a strategic response on an item which asked them what they would do when they encountered an unknown word in a sentence (IRA item #13), indicating that they were aware of the significance of using the sentence context to determine the meaning of the word. However, on an item asking what they would do if they did not understand the meaning of an entire sentence (IRA item #14), the students indicated that rereading the sentence would be more helpful than using the context of the passage to comprehend its meaning. This response suggests that while the gifted/Ld students were aware of the importance of using the context or meaning of the passage in a specific incident when decoding words, they were not aware and could not generalize this strategy to the broader more complex problem of sentence comprehension. Consequently, based on the students' performance on the regulation subscale of the IRA, the gifted/Ld students appear to be inadequately aware of generalizing regulation strategies from one situation to another.

When regulating their own reading, the three students indicated that they would never skip any difficult words, sections they did not understand or unimportant or meaningless parts when reading a story (IRA question #15).

It is difficult to discern from the questionnaire if the students responded this way because they have been taught in remedial classes not to skip anything when reading, or if this represents a lack of flexibility and adaptability in regulating and managing their own reading.

With the exception of Andrew, who obtained a subscale score of 90%, the scores were generally in the average range on the evaluation subscale, which measures the individual's assessment of his or her own knowledge and skills, the goals and the purposes of the task and strategies related to the reading activity. All of the gifted/Ld students correctly identified the importance of the first and last sentence in a story and reported that checking or evaluating understanding while reading would assist them in becoming better readers. However, only Andrew was aware of which sentences were the most important ones in the story, as both Bobby and Michelle concluded that all of the sentences were important.

Comparison of the Three Gifted/Ld Students on the Think Aloud Task

The individual case studies presented earlier examined the total number of errors as well as the specific word and phrase errors identified by each student on the think aloud reading activity. In the following section, the students' results on the error detection task will be compared. Then a comparison of the students' statements on the think aloud protocols will be made to explore reading strategies that were common to all three of the gifted/Ld students' protocols and to identify where individual differences in reading strategies were apparent.

A review of the error detection data indicates that all of the students identified a number of errors embedded in the think aloud passages and demonstrates that all of the gifted/Ld students were monitoring their reading to some extent (See Figure 3). However, the total percentage of errors detected by the students in the passages suggests that none of the students demonstrated exceptionally strong monitoring skills and that their use of evaluation or regulation strategies appears to be inadequate. The students' percentage of errors detected in Passage 1 and 2 can be seen in Figure 4 and in Figure 5, respectively.

Overall, Andrew detected the most errors in the passages, but in comparing the passages, Andrew's monitoring skills appeared to be extremely inconsistent. The difference in monitoring observed between the first and second passages may have resulted for a number of different reasons: a difference in the passage difficulty, an inadequate background knowledge on one topic, the failure to identify or recall the purpose for reading the passage, boredom, or forgetting to underline the errors. However, it was not possible to determine the exact reason for the difference observed.

PERCENTAGE OF ERRORS DETECTED
IN PASSAGES ONE AND TWO

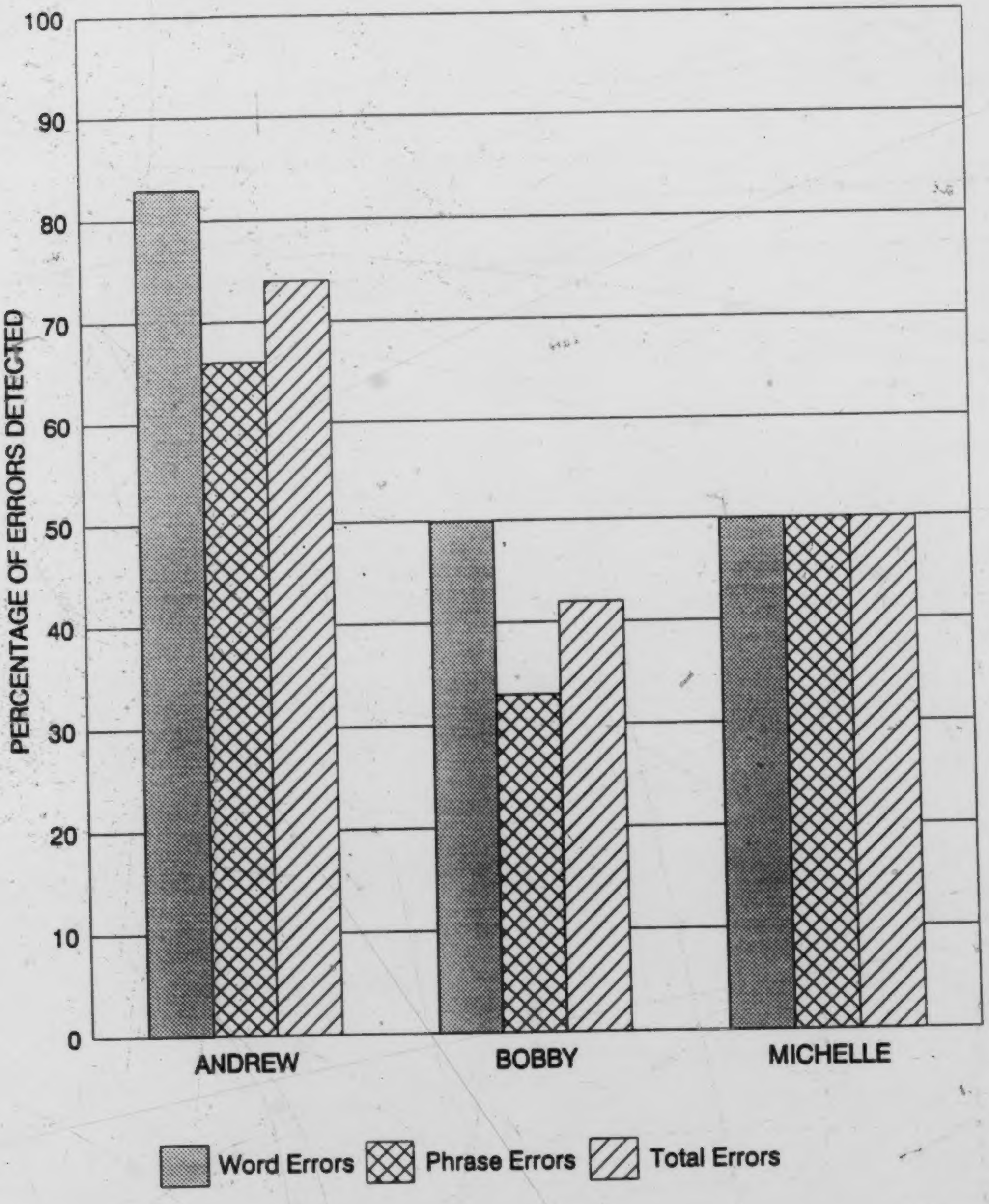


Figure 3

PERCENTAGE OF ERRORS DETECTED IN PASSAGE ONE

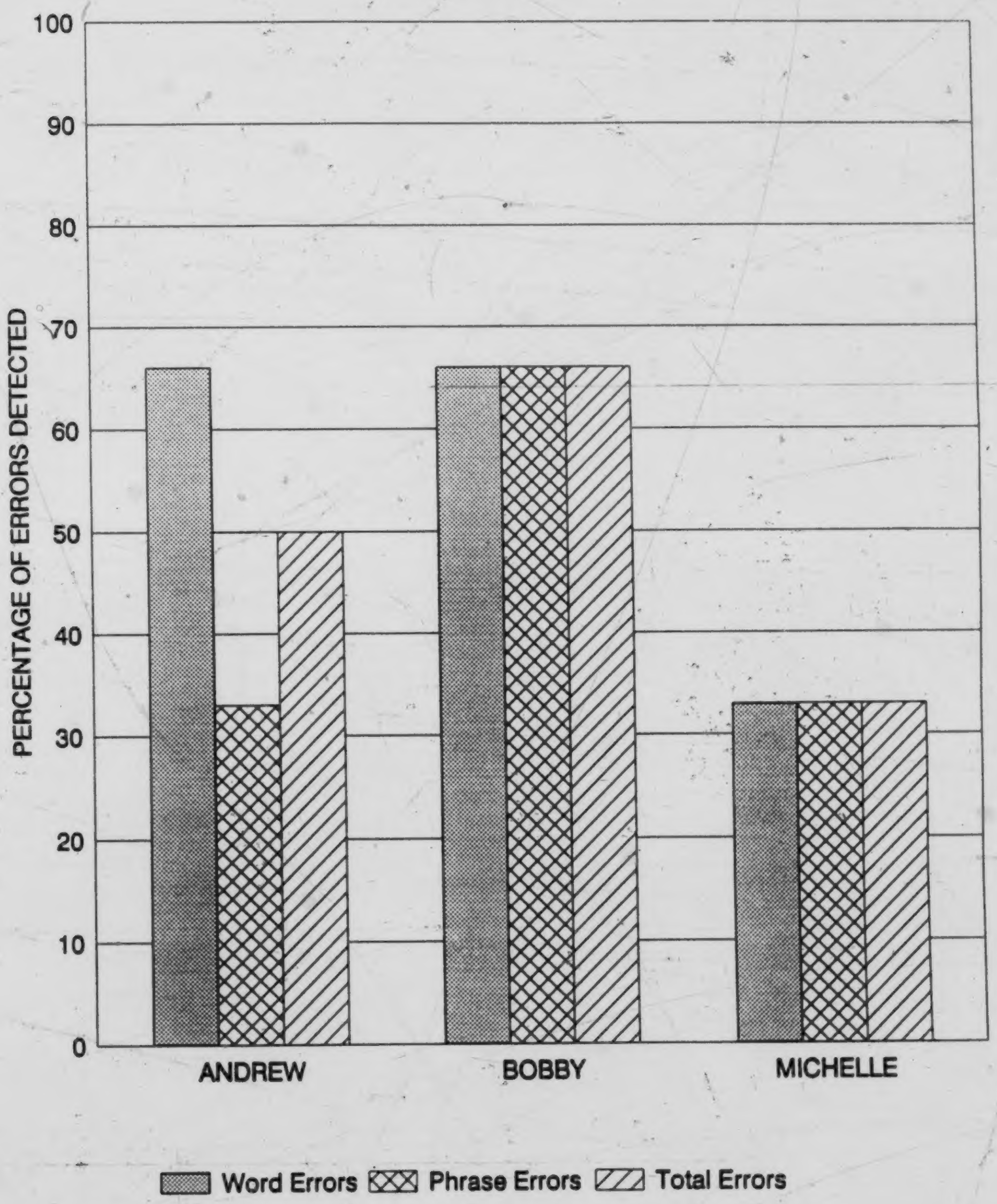
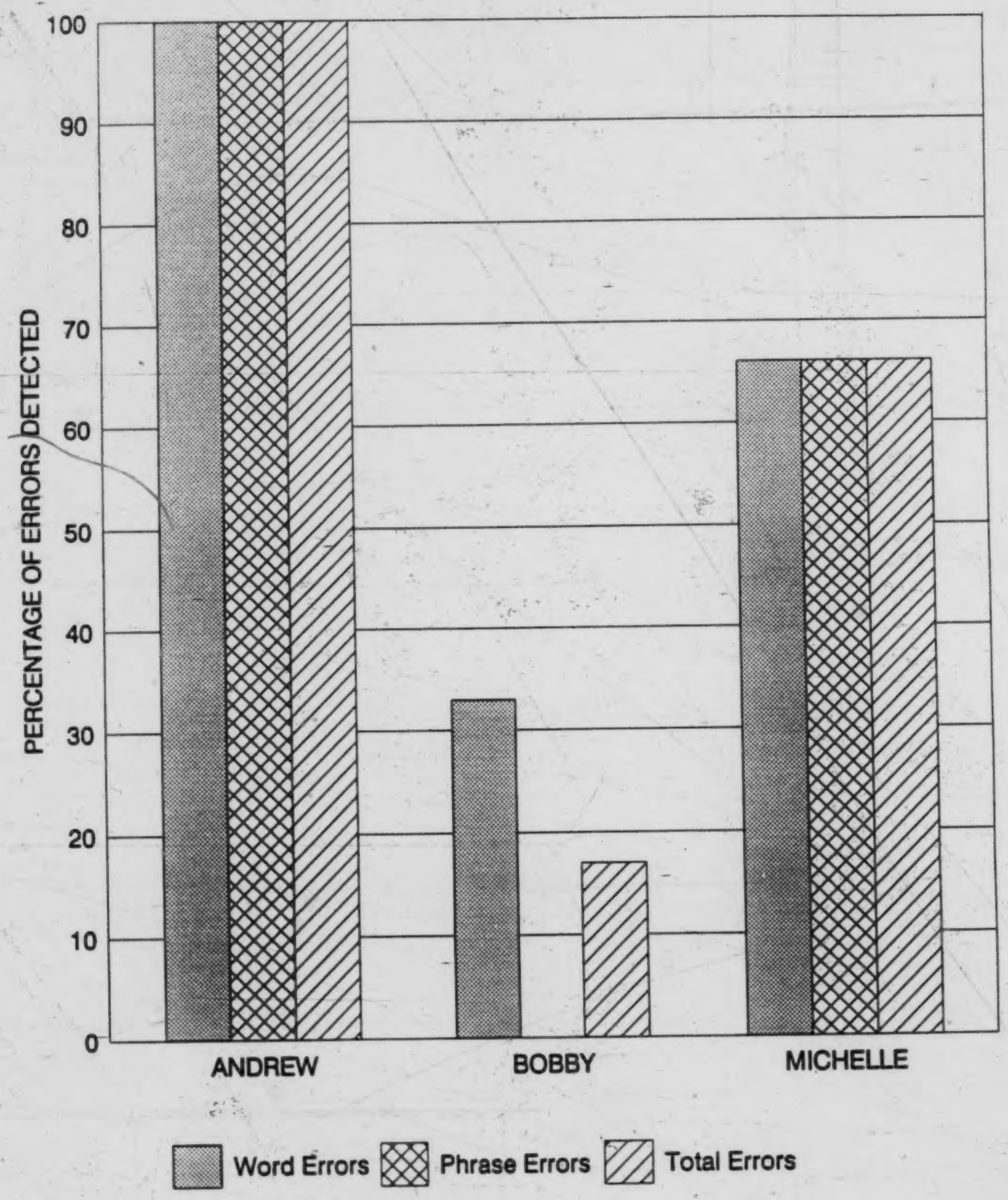


Figure 4



PERCENTAGE OF ERRORS DETECTED IN PASSAGE TWO

Figure 5

An examination of the total number of strategies transcribed on the think aloud protocols indicates that evaluation, paraphrasing and regulation strategies were reported most frequently by the three gifted/Ld students. Although planning, synthesis, expansion and opinion statements were rarely reported on the protocols, they will not be excluded from the discussion as they provide significant information about how these gifted/Ld students process information when reading (See Figure 6). In an evaluation of the students' protocols, it must be stressed again that a student's failure to report using a specific strategy when reading, does not necessarily mean that the student was not using it. The student may not have reported the strategy for a number of reasons. For instance, the student could have forgotten to report the strategy or the strategy may have been used so automatically that the student was not aware of using it. The only conclusion that can be made is that student did not report using it.

Evaluation and paraphrase statements together comprised from 58% to 74% of the students' think aloud statements. All the students reported evaluation statements most frequently. These statements were usually followed by paraphrase or regulation statements and very occasionally were reported independently or preceded by a paraphrase statement. An analysis of the content of the evaluation statements indicates that the students primarily used

SUMMARY OF READING STRATEGIES ON THE THINK ALOUD TASK

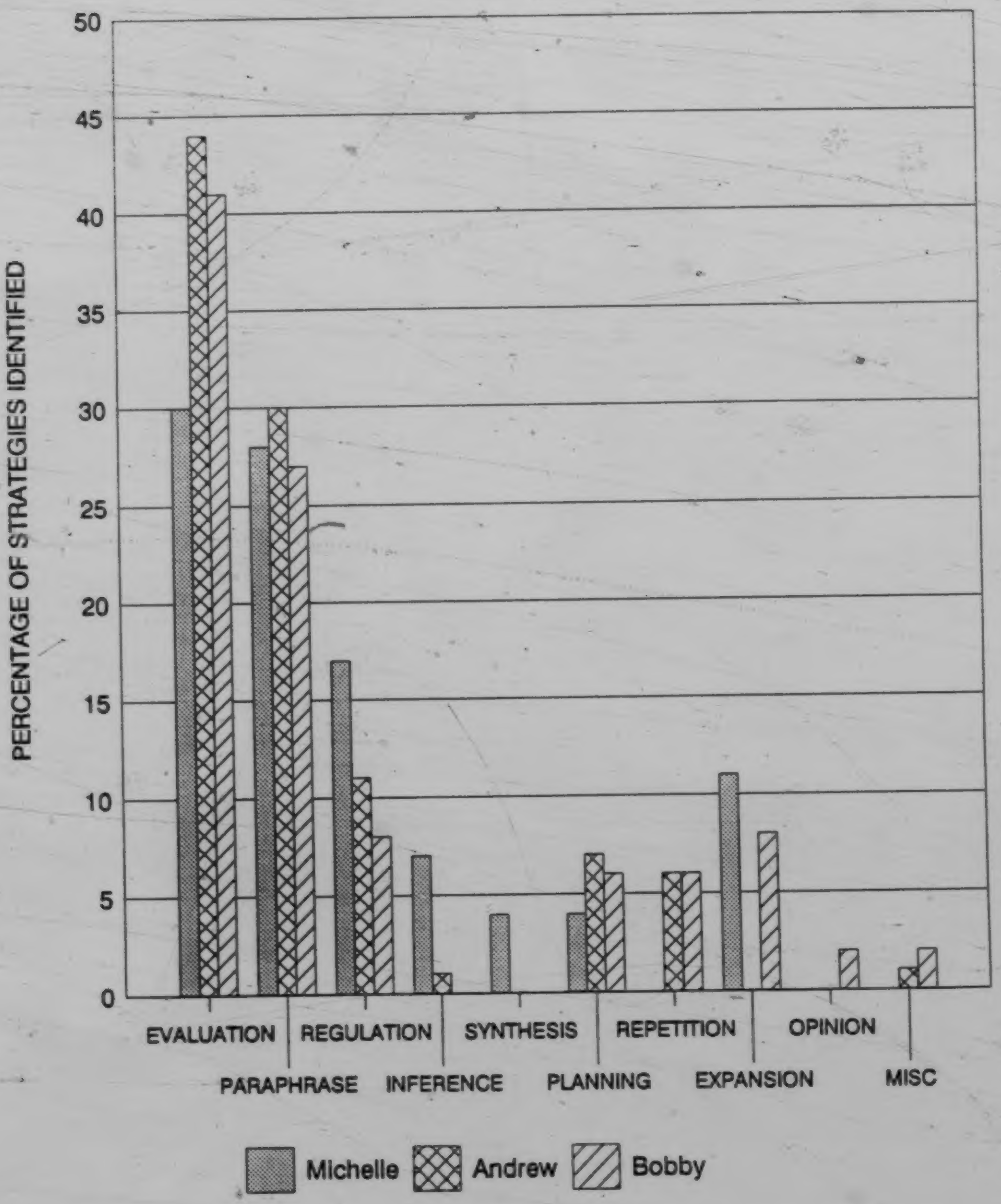


Figure 6

evaluation statements to appraise their own comprehension. Comments such as "this makes sense to me" or "this doesn't make sense, I don't get it" were commonly found in the three students' protocols. The high number of evaluation statements found in Michelle's, Andrew's and Bobby's protocols may signify that most of the students' energy was directed to self-appraisal aspects of reading so that little attention could be given to selecting, implementing and monitoring comprehension strategies.

The contents of the students' evaluation statements varied somewhat among the students. Bobby's evaluation statements on the protocols were somewhat different than Andrew's and Michelle's statements, as he tended to focus on accuracy in word recognition and decoding rather than on understanding the meaning of the sentence. Additionally, although Andrew used a large number of evaluation statements on the think aloud reading activity, his evaluation of his own understanding was not always correct. Often while reading the sentences, Andrew unknowingly decoded a word incorrectly and then indicated that he understood the passage. However, paraphrase statements following the evaluation of his reading suggested that his decoding errors actually resulted in inaccurate or faulty comprehension. Therefore, although Andrew often indicated that he understood the passage, he in fact misunderstood what he was reading because of faulty decoding skills.

Paraphrase statements were also frequently reported by the gifted/Ld students on the think aloud activity. All of these students rephrased the sentences from the passages. However, the content and the quality of these statements differed significantly among the three gifted/Ld students. Michelle employed a paraphrase statement after each sentence while reading. Her paraphrase statements were comprised of clear and precise descriptions of the sentences she had just read and were usually recounted in her own words. In contrast, Andrew's paraphrase statements included short summaries of a small portion of the information from the sentence just read. These paraphrase statements were often vague and inaccurate. Like Andrew's, Bobby's paraphrase statements also included only a small portion of the information that was presented in the sentence he previously read. However, Bobby's statements frequently included several words repeated from the text verbatim. All of the gifted/Ld students tended to rephrase information from the sentence just read, and none of the students' paraphrase statements made reference to other details presented earlier in the text.

Regulation statements were the third most common statements reported on the think aloud reading activity. However, these statements were not reported as regularly as the evaluation and paraphrase statements and ranged from 8% to 17% of the total number of statements reported by each student. Regulation statements were often found following evaluation statements and usually contained a reference to rereading a sentence or phrase. Very few other regulation strategies were noted such as skimming, predicting, self-questioning, or hypothesis testing. As a result, in relying predominantly on one strategy the students were unable to amend comprehension difficulties they experienced.

One interesting regulation statement reported by Michelle was the use of visual imagery to assist her in reading comprehension. The use of imagery strategies while reading may involve complex cognitive processes and may signify that Michelle is using her strong visual reasoning skills to assist her in reading comprehension.

Planning statements, which included statements referring to the deliberate selection of strategies or actions to fulfil a future reading goal, constituted approximately 4% to 7% of the total number of statements reported by the three gifted/Ld students. None of the students reported using planning strategies before reading or near the beginning of the text, and only two types of planning statements were noted on the protocols.

Michelle's and Andrew's limited planning statements indicated their intention of rereading a sentence to assist their reading comprehension. This type of planning statement should not be confused with the regulation statements about rereading. The planning statements pertaining to rereading a sentence indicate that the students are making preparations to reread the text, whereas the regulation statements indicate that the student has already completed rereading the text. Bobby's planning statements were slightly different than the rereading example of planning statements. He used planning statements to indicate that the next action he was going to take was to read the next sentence to find out more about the subject.

Two of the three gifted/Ld students reported using **expansion or opinion** statements on the think aloud task. This suggests that these students, Michelle and Bobby attempted to use their own background knowledge and experience to provide meaning to the text. However, Bobby's elaborations were often quite different from the text, and he did not seem to check his own elaborations with the text. As a result, his understanding of the text was often quite different from the intended meaning of the text.

Michelle was the only student who used **synthesis** statements on the think aloud reading task. Her use of synthesizing statements while reading suggests that she was beginning to integrate information when reading, in an attempt to comprehend the text.

Additionally, several **inference** statements were evident on both Michelle's and Andrew's protocols, which suggests that these students were attempting to fill in the information that was not explicitly stated in the text.

Both of the students were fairly creative in their use of inferencing strategies. For example, in attempting to understand the "growling" that was bothering the person in the passage on mosquitoes, Andrew deduced that the growling noises must be coming from the character's hungry stomach. Although the inferences made by both Michelle and Andrew appeared to be logical in the sentence they were reading, neither of the students checked later to determine if the inferences continued to make sense after reading more information in the text. Their responses indicate that although the students made use of inference statements, they failed to monitor and check their inferences later in the passages.

Lastly, three general observations followed from a comparison of the students' think aloud protocols. First, the students appeared to use the rereading strategy frequently to solve a comprehension problem. Although the students were specifically instructed at the beginning of each of the passages that they could look forward or backwards through the passage, none of the students were observed using this strategy. They only reread the sentence containing the problem, concentrating on the meaning of individual words within the sentence rather than on ideas or relations between sentences.

The second general observation was that once the students selected and used a comprehension strategy, they did not report revising or monitoring the strategy to see if it was appropriate and actually resolved the comprehension problem. Finally, there was no evidence in the students' protocols that the gifted/Ld students used self-questioning or hypothesis-testing strategies.

Chapter Summary

Chapter four presented individual case studies on three gifted/Ld students. Educational and personal background information was reviewed, and the data collected on the IRA metacognitive interview and on the think aloud error detection task was analyzed. Following the case studies, a comparison was made contrasting the metacognitive awareness and use of reading strategies.

Overall, the findings indicate that students reported the use of evaluation strategies most frequently. They appeared to be knowledgable about the importance of self-appraisal of their own reading skills, the task parameters, and the reading strategies available. Analysis of the think aloud protocols revealed that the content of each student's evaluation statements were different. All three of the students demonstrated poor knowledge about the importance of setting a purpose and systematically planning before beginning a reading activity. Correspondingly, the think aloud protocols indicated that the students also did not report using many **planning** strategies on the reading passages.

While the metacognitive interview indicated the three students were extremely knowledgeable about when and why to use reading strategies about a variety of strategies, they reported few **regulation** statements on the think aloud protocols. The three gifted/Ld students solved comprehension problems primarily using a rereading strategy which highlighted their word-by-word or sentence-by-sentence comprehension monitoring and their failure to integrate the information they were reading into a unified whole.

Paraphrase statements were also used by the three gifted/Ld students both to evaluate and regulate their reading. However, the content and quality of the students' paraphrase statements differed significantly. **Inference, synthesis**, and **elaboration** statements were rarely noted on the students' protocols and skimming, predicting, self-questioning and hypothesis-testing statements were nonexistent.

In general, the three gifted/Ld students appeared to be actively monitoring their own reading progress and exhibited strengths in their knowledge of **evaluation** strategies and **conditional knowledge** components of reading. Weaknesses were apparent in knowledge and use of **planning** and **regulation** strategies. However, perhaps the most significant finding from the analysis of the data was the individuality of the students' learning strengths and difficulties. Although some general trends were apparent when examining overall totals or scores, it was apparent when reviewing each individual student's data that the students' specific knowledge of evaluation, planning, regulation and conditional knowledge components of reading were diverse. The variation in the gifted/Ld students' statements on the reading protocols also highlights the individuality of their information processing while reading. The interaction of the students' individual background knowledge and cognitive processes manifests itself uniquely within each student.

In addition to identifying individual strengths and weaknesses in the way the gifted/Ld students processed information while reading, it became apparent that although these students demonstrated basic reading comprehension skills, these students didn't appear combine these individual skills together when reading independently. Therefore one significant difficulty that all three gifted/Ld students demonstrated in reading comprehension was integrating evaluation, planning, conditional knowledge, and regulation skills.

Chapter V

SUMMARY, IMPLICATIONS AND LIMITATIONS

Introduction

This chapter contains a brief review of the exploratory study on metacognitive reading processes of three gifted/Ld students and presents conclusions based upon a synthesis of the research results. A discussion of the limitations of the study and the implications of these findings for the three gifted/Ld students, parents, teachers, and researchers will follow. Finally, suggestions and directions for further research will be presented.

Summary of the Study

This study examined the thinking processes of three gifted/Ld students and explored their metacognitive awareness and use of reading strategies in order to determine specific instructional needs of each student in reading. More specifically, the study examined the gifted/Ld students' awareness of planning, evaluation, regulation, and conditional knowledge in reading and observed their independent use of planning, evaluation and regulation strategies in reading.

Three students were selected to participate in the study and were identified as gifted/Ld through the use of the Wechsler Intelligence Scale for Children-Revised and reading subtests from the Canadian Test of Basic Skills.

Background information and academic histories were also informally collected and analyzed, and the students' current reading comprehension skills were assessed both qualitatively and quantitatively using the Woodcock Reading Mastery Tests-Revised and the Burns-Roe Informal Reading Inventory.

The primary focus of this study was the metacognitive components of the reading process. Following the collection of data on the students' individual reading skills, the three gifted/Ld students were interviewed using the Index of Reading Awareness to assess their metacognitive awareness of evaluation, planning, regulation and control strategies in reading. The students' use of reading strategies was assessed directly on two think aloud reading passages. As the students read the passages, they were asked to underline any errors in the passage and were also required to introspect and tell the investigator what they were thinking. The think aloud activity was videotaped and later transcribed. The resulting protocols were analyzed both quantitatively, with interrater reliabilities performed on the protocols, and qualitatively, enabling identification of the students' strengths and weaknesses in reading. Finally, a comparison was made among the three gifted/Ld students and common strengths and weaknesses were identified.

The results of the study will be presented in reference to the four research questions outlined in chapter one. The format of presentation will include a restatement of the research question accompanied by a discussion of the conclusions drawn from the findings.

Results

Question 1: Knowledge of strategies

> Are the gifted/Ld students aware of planning, evaluation, conditional knowledge and regulation strategies used in reading comprehension, as measured by the Index of Reading Awareness?

A student's knowledge of his or her own cognitive processes is believed to be an essential component of the learning process (Brown, 1980; Flavell, 1976; Paris, 1984). Moreover, researchers have indicated that the awareness of planning, evaluation, conditional knowledge and regulation strategies is an important and integral component in reading comprehension (Brown, 1981; Paris & Lindauer, 1982). In this section, the students' total scores on the Index of Reading Awareness questionnaire will be reviewed, followed by an analysis of their general strengths and weaknesses. In addition, individual differences in metacognitive knowledge will be briefly summarized.

Overall, the three students' total scores on the IRA ranged from 62% to 70%, indicating that all three possess some knowledge about reading strategies. Several general trends were apparent when reviewing the IRA subscale scores. First, all the students appeared to be intensely aware of conditional knowledge aspects of reading which involve the knowledge of the conditions that affect learning: knowing when to use a specific strategy and why that strategy would be effective. Specifically, all students were able to identify the best method to remember a story, and could identify the most helpful strategy when reading a book and then writing a book report.

The literature suggests that skilled readers are far more knowledgeable about decoding, comprehension and reading strategies than poor and learning disabled readers, and researchers have found that poor readers lack knowledge about when and why to use specific reading strategies (Forrest & Waller, 1980; Paris & Lindauer, 1982). Therefore, although these three gifted/Ld students have been identified as poor readers and demonstrate inadequate reading skills, they appear to exhibit characteristics of good readers in terms of conditional knowledge components of reading.

The three gifted/Ld students also appeared to be acutely aware of the importance of using evaluation strategies when reading. They all recognized the importance of assessing their own present knowledge, their own reading abilities, and they were knowledgeable about the significance of several features of the text.

In terms of both conditional knowledge and evaluation, the three gifted/Ld students' knowledge is similar to the research findings characterizing skilled readers (Baker &

Brown, 1984b; Garner, 1987; Paris & Myers, 1981). However, these gifted/Ld students were specifically selected for the study because their reading skills were more than 1 1/2 years below their current grade level. Thus the findings contradict the literature which suggests that poor and unskilled readers are inadequately aware of reading processes. This discrepancy in the findings may be due to the special nature of these learning disabled students. In conjunction with their learning disability in reading, the three gifted/Ld students have exceptional skills in verbal reasoning and problem solving, as indicated in the WISC-R results. Therefore it is possible that these students may be using their strong verbal reasoning skills to assist them in identifying when to use a particular strategy, how to use a particular strategy and why that particular strategy would be effective.

In contrast to their awareness of evaluation and conditional knowledge strategies, the three gifted/Ld students' knowledge of planning and regulation strategies was exceptionally weak. None of the students was aware of the importance of making plans and identifying a purpose before reading. Furthermore, while all the students were aware of the importance of using the context to identify the meaning of unknown words, none of them demonstrated an awareness of the flexible use of strategies when reading. These results are congruent with research which indicates that unskilled readers are not effective in constructing plans and regulating their comprehension as they read (Baker & Brown, 1984b; Brown, 1981; Paris & Myers, 1981).

Although general trends in metacognitive awareness of strategies were apparent, an analysis of the students' individual responses in the questionnaire indicated significant individual differences in their specific knowledge of strategies. For example, although both boys received the same score on regulation strategies, Bobby was knowledgeable about the use of skimming, the value of adjusting the rate of reading, and the importance of using context when decoding a word, whereas Andrew was only aware of the purpose and use of rereading when experiencing comprehension difficulties. Individual differences were also apparent in the students' knowledge of planning, evaluation, and conditional knowledge processes.

In summary, the findings on metacognitive knowledge revealed that the three gifted/Ld students' knowledge of reading processes was extremely strong in some areas and significantly weak in others. Like skilled and gifted readers, they were knowledgeable about the conditions of reading and the importance of self-evaluation when reading. However, like many learning disabled and poor readers, the three gifted/Ld students lacked adequate knowledge of planning and regulation strategies for reading. Moreover, although the students demonstrated similar overall patterns of strengths and weaknesses, they exhibited individual differences in metacognitive awareness of evaluation, planning, regulation, and conditional knowledge.

Question 2: Use of strategies

> Do gifted/Ld students demonstrate the use of planning, evaluation and regulation strategies on a think aloud reading task?

Reading comprehension appears to be dependent not only upon the students' knowledge of their own cognitive processes, but also upon the application of this knowledge when reading. The deliberate selection and use of planning, evaluation, and regulation strategies assists the students in managing and regulating their own reading and enhances the students' understanding of what they are reading (Garner, 1987; Paris & Winograd, 1990; Wong, 1986). The following section reviews the strategies used by the gifted/Ld students on the think aloud reading activity. It includes a discussion of the frequency of strategies reported, the types of strategies employed and the ways in which the strategies were used by the three gifted/Ld students.

Although the three gifted/Ld students demonstrated knowledge of a wide range of strategies on the metacognitive interview, their reported use of these strategies on a reading task was more limited. The pattern of strategy use reported by the students indicated that they relied heavily on two or three reading strategies. All three students reported using evaluation, paraphrasing, and regulation strategies most frequently. Expansion, opinion, inference and synthesis statements were seldom reported on the think aloud passages.

Evaluation statements were most frequently reported by the three gifted/Ld students on the think aloud activity. Close examination of the evaluation strategies used by the gifted/Ld students indicated that they primarily consisted of the students' appraisal of their own comprehension.

Several studies exploring the utilization of strategies indicate that good readers use self-evaluation and self-appraisal strategies when reading (Garner & Kraus, 1982; Paris & Myers, 1981). In contrast, researchers have found that unskilled and learning disabled readers lack evaluation skills, or make very little effort in appraising their own skills (Wong, 1986; Paris & Winograd, 1990). Therefore the three gifted/Ld students appeared to execute evaluation strategies in a manner similar to skilled readers. Paradoxically, however, although the three students reported using evaluation strategies most frequently, they still failed to detect a large number of the errors embedded in the think aloud passages.

One quantitative study using the think aloud methodology noted an interesting trend which may help to explain this inconsistency between the large number of evaluation statements made by the gifted/Ld students and their inadequate detection of errors. In examining skilled and unskilled readers, Meyers, Lytle, Palladino, Devenpeck, & Green (1990) found that the frequent use of evaluation strategies does not necessarily relate to increased reading comprehension. In fact, they found a negative correlation between the number of evaluation strategies reported on the think aloud task and reading comprehension (Meyers, Lytle, Palladino, Devenpeck, & Green 1990). This literature suggests that although self-appraisal and evaluation is an important component in reading comprehension, poor implementation or overuse of evaluation strategies may affect the amount of information the students comprehend. More research is needed to further examine the use of evaluation strategies and to explore the relationship between the use of evaluation strategies and reading comprehension.

Paraphrase statements were used by the students on the think aloud error detection task both to evaluate and to regulate their own performance. All of the students tended to rephrase information from the sentence just read but none of the students combined information from two or more sentences in a paraphrase statement. As well, individual differences were apparent in the quality and accuracy of the paraphrase statements. For example, an analysis of Bobby's think aloud protocols indicated that although he frequently used paraphrase statements, they were often imprecise incorrect or not related to the text. While paraphrasing has been noted as a useful strategy that skilled readers use to comprehend text, a large number of inaccurate or incorrect paraphrase statements, such as those evident in Bobby's protocols, have been found to correlate negatively with reading comprehension (Meyers et al., 1990). Apparently if not used correctly, paraphrase strategies may in fact hinder rather than assist the gifted/Ld students in comprehending what they are reading.

The three gifted/Ld students also reported a significant number of **regulation** statements on the think aloud reading passages and thus appeared to be monitoring their comprehension and attempting to actively construct meaning when reading. However, a limited variety of regulation strategies was reported. These regulation strategies primarily consisted of the students rereading a sentence in an attempt to comprehend what they were reading. No attempt was made to look further back into the text or reread earlier passages.

Planning statements were almost nonexistent in the protocols. The students did not report any attempt to identify a purpose or systematically plan before reading. The few planning strategies used by the students appeared to be ineffective in reducing comprehension difficulties. Previous learning strategy research has shown that skilled readers actively attempt to clarify the purposes and task demands through self-questioning prior to reading the text (Anderson, 1986; Paris & Jacobs, 1984). Therefore, the three gifted/Ld students' planning skills appear to be more similar to those of unskilled or learning disabled readers who often do not know how to formulate plans when reading, or plan to use ineffective strategies to repair comprehension problems, or formulate plans based on irrelevant or inaccurate reading goals (Kreutzer, Leonard & Flavell, 1975; Paris & Lindauer, 1982).

In summary, evaluation, paraphrase, and regulation statements were reported most frequently by all three gifted/Ld students on the think aloud error detection task. These students appeared to ardently appraise and evaluate their own understanding while reading, and they selected and implemented a small number of strategies in an attempt to rectify comprehension failures. However, the students did not report identifying a purpose before reading and did not report organizing or making preparations before beginning to read. As well, in regulating and repairing reading comprehension difficulties, the students primarily used paraphrasing and rereading strategies. When these strategies were unsuccessful in solving the comprehension problem, they did not report making further attempts to adjust or revise these strategies.

These descriptions of strategy use on the think aloud reading activity are generalizations based on a comparison of the students' overall performances. Therefore, these general conclusions provide summary data about how these students process information. Individual differences, however, were readily apparent in the types of strategies reported, the way the strategies were implemented and used, and the accuracy of the strategies executed. For example, although evaluation, regulation and planning strategies were used regularly by all three students, two other strategies were each reported by only one student. Michelle was the only student who reported using synthesis strategies on the think aloud reading task, while Bobby was the only student who reported using opinion strategies.

Additionally, although evaluation, regulation and planning strategies were used by all of the students, the method and style in which the strategies were implemented varied among the students. For example, in comparing and analyzing the students' evaluation statements, it was evident that Bobby's statements focused primarily on accuracy of word recognition and decoding, whereas Andrew's and Michelle's evaluation statements focused predominantly on reading comprehension.

Furthermore, although the gifted/Ld students may have reported using a number of strategies when reading, they did not always implement these strategies correctly. For example, when paraphrasing information from the text, Andrew's statements frequently included a short summary of a small portion of the information just read, However, the information reported was often inaccurate or conflicted with the information in the text.

In summary, individual differences were evident in the types of reading strategies used, as well as the content, quality and accuracy of the reading strategies employed by the three gifted/Ld students. A review of the detailed background information and the individual strengths and weaknesses outlined in the case studies would be invaluable in designing a suitable program which meets the individual needs of the gifted/Ld students.

Question 3: Identification of errors

> Do gifted/Ld students detect errors when reading a passage?

The ability of the gifted/Ld students to detect incomprehensible information in the text is believed to depend on the effective use of evaluation, planning and regulation strategies (Paris & Jacobs, 1984). The following section reviews the results on the number and types of errors the three gifted/Ld students identified on the error detection task.

A review of the gifted/Ld students' results on the error detection task indicates that all three students identified some of the word and phrase errors embedded in the passages. This suggests that all three students were actively attempting to monitor their own understanding while reading. However, a closer analysis of the error detection data indicates that neither Bobby's or Michelle's monitoring skills were particularly strong as each only identified between 42% and 54% of the total errors embedded in the text. While Andrew's monitoring skills were slightly stronger, they appeared to be inconsistent as the total numbers of errors detected in the two passages were 50% and 100%. Therefore, while the overall scores on the error detection task indicated that the three students do monitor their understanding while reading, the results suggest that the gifted/Ld students did not appear to be very adept or consistent in evaluating or regulating their reading progress.

An examination of the data collected on word and phrase errors indicated that the students were generally more proficient at identifying word errors than phrase errors. As well, the specific errors that were identified on the think aloud passages varied among the students. Moreover, a review of the individual students' results revealed that Andrew's detection of word and phrase errors was extremely inconsistent across passages. Andrew identified all of the phrase errors in one passage but only 33% of the phrase errors in the second passage. An analysis of Andrew's think aloud protocol did not reveal any clues as to why there was so much variation in his skills from one passage to another.

Numerous studies on unskilled and learning disabled readers have reported that unskilled readers often fail to identify errors embedded within a passage and demonstrate inconsistent monitoring skills (Garner & Kraus, 1982, Paris & Winograd, 1990; Wong & Wong, 1986). Researchers from these studies suggest that poor readers may mistakenly believe that they understand what they are reading because they do not focus their attention on the most important aspects of the reading material. This explanation seems to correspond to Andrew's results on the think aloud task in which he focused his attention primarily on evaluating the reading task and his progress, and may be one possible explanation for the large variation in the number of errors Andrew identified on the think aloud error detection task.

Question 4: Compensatory strategies

> Do the gifted/Ld students use compensatory methods to solve reading comprehension problems when reading?

Two unique strategies were identified in the think aloud protocols which assisted the students in solving comprehension problems. They are considered compensatory strategies because the students appeared to use their individual strengths and skills in one area to assist them in their weakest areas of reading.

A compensatory strategy that was reported by Michelle was the visualizing strategy, which was used to assist her in comprehending what she was reading. Background and educational information collected in the case studies indicated that Michelle has superior visual reasoning skills, and it appears that she uses these strong skills to assist her when she has difficulty reading. The use of imagery as a reading strategy was first noted on think aloud protocols of gifted students in grades 4 to 7 (Wingenbach, 1982, 1984). Further evidence of the use of visualizing strategies has been noted by Kletzien (1991) who observed that good readers reported using visual imagery strategies on reading passages written at the independent level, but not on passages at the instructional or frustration levels.

Similarly, Bobby used his strengths, which were in verbal reasoning areas, to assist him in understanding what he was reading. An analysis of his statements on the think aloud reading passages indicated that he used several elaboration and opinion statements. Bobby tended to supplement the information he was reading with prior knowledge or background information. As a result, the meanings he derived from the text were often based primarily on his own elaborations of the text. Bobby, therefore, used his strong verbal skills and his background knowledge and experiences to assist him in comprehending what he was reading.

Andrew, however, did not report using any specific compensatory strategies. He did not appear to use visual imagery or personal background information when attempting to comprehend the text.

In summary, two of the students, Michelle and Bobby, appeared to employ compensatory strategies to solve reading comprehension problems. These students used their individual strengths to assist them in understanding what they were reading. Michelle used her strong visual reasoning skills and visual imagery strategies to monitor her comprehension, whereas Bobby used his strong verbal reasoning skills, and employed elaboration strategies in an attempt to understand the reading passages.

Summary of Results

The results of the study suggest the potential use of metacognitive assessment techniques, such as the Index of Reading Awareness questionnaire and the think aloud protocol analysis, as a method to identify how gifted/Ld students process information when reading. Additionally, the results of the study highlight individual differences in the knowledge and the execution of strategies by gifted/Ld students when reading. Moreover, examining the data from the metacognitive assessment indicates that the three gifted/Ld students exhibited characteristics of both the learning disabled and the gifted populations.

Like many poor and unskilled readers, the gifted/Ld students demonstrated inadequate knowledge about the importance of systematically planning before and during reading, and they appeared unaware of how to regulate their own reading progress. However, unlike learning disabled or poor readers who have been characterized as "strategy deficient" or "inactive" learners (Torgeson, 1977; Wong, 1986), the three gifted/Ld students' who participated in the study did appear to actively monitor their reading progress. They also reported using evaluation, planning, and regulation strategies when reading, but their use of these strategies was often inadequate and inefficient. They tended to rely on a small number of strategies and were not proficient in executing the appropriate strategies flexibly.

The results from the study indicated that these students also exhibited metacognitive knowledge and strategic use of reading strategies characteristic of skilled and gifted readers. The three gifted/Ld students demonstrated exceptional awareness of conditional knowledge components of reading. They were acutely aware of when and why a variety of different reading strategies should be used and relied on their strong reasoning abilities to assist them in comprehending the text. Additionally, the students were keenly aware of their own reading skills and could easily and accurately evaluate their own knowledge while reading. Of special interest was the use of visual imagery by one of the students to assist her in understanding the sentence she was reading. This imagery strategy appears to involve higher level thinking processes most evident in skilled and gifted readers.

Therefore in examining the results of the metacognitive reading assessment, it appears that the three gifted/Ld students exhibited both strengths and weaknesses in knowledge and use of reading strategies. The gifted/Ld students demonstrated exceptional metacognitive skills characteristic of skilled and gifted readers, while at the same time exhibiting weak or inadequate metacognitive skills characteristic of unskilled and learning disabled readers.

Limitations of the Study

This study, which utilizes both a quantitative and qualitative approach to explore the metacognitive reading processes of the gifted/Ld students, has certain limitations that require consideration in the interpretation of the results. First, the sample of students selected to participate in the study was small due to the unique characteristics of this population and the difficulties in identifying students who are both gifted and learning disabled. As a result, the students were not randomly selected, and the limited number of students involved in the study restricts the generalizability of the study. Therefore, further research is needed to explore general trends and questions arising from the study.

A second limitation involves the measurement of metacognitive reading awareness. Self-report questionnaire instruments like the Index of Reading Awareness are potentially biased as the students may complete the questionnaire according to what they feel is the correct or desirable response. In addition, the students' responses may not always be accurate due to memory failure as a result of the intervening time interval between the actual participation in reading processes and the reporting on the questionnaire or the automaticity of the reading strategy (Garner, 1987).

Additionally, the questionnaire instrument itself has a number of limitations. The IRA was designed to measure Paris' conceptualization of reading awareness, and therefore other categories of metacognitive knowledge which may be equally important to successful reading may not be appraised. As well, although the multiple-choice format of the IRA overcomes many of the recognized weaknesses of verbal report measures, the issue of guessing is introduced. Moreover, the instrument somewhat restricts the students' responses because it provides only three multiple-choice alternatives from which students may choose. However, the investigation of metacognitive components of reading is a relatively new domain in reading research, and as a result, very few assessment measures have been developed. Limitations of current research instruments may be overcome as researchers learn more about children's knowledge and awareness of reading processes.

Thirdly, like the metacognitive questionnaire technique, the think aloud error detection procedure also has certain limitations which should be noted. Reading involves the interaction between the reader, the text, the goal and the content of the material. As a result, the number and the kinds of strategies reported in the study may not be the same as those used with other types of reading materials. Therefore, the different types of text, and the length and reading level of the text must be considered in programming. This study specifically examined narrative passages which were approximately 190 words in length and were at the students' instructional reading level. Further research using different types of passages of various lengths and reading levels should be examined to determine how the students' metacognitive awareness and use of reading strategies varies on different reading passages.

A final limitation of the think aloud procedure is that the structure and methodology of the study may have induced the students to use paraphrase or evaluation strategies more often than normal. The line by line format of this study may have structured the students' reading somewhat encouraging them to use some strategies more frequently in this structured task than in their own independent reading. However, in dividing the passages into larger segments, the students' memory may confound the results. Longer passages may provide more natural reading experiences, but the students are more likely to forget and are more likely to recall inaccurately what they were thinking while they were reading (Afflerbach & Johnson, 1984; Anderson, 1986; Garner, 1987).

Implications

This exploratory study revealed more fully the complexity of the comprehension processes in reading. Reading comprehension involves more than just the acquisition and accumulation of a number of skills, as it requires the students to actively search for meaning while reading and is dependent upon the students' regulation of their own strategic thinking. The results of the study exploring the metacognitive awareness and use of reading strategies has implications for the three gifted/Ld students participating in the study, for educators and for researchers.

In terms of programming and instruction, the findings of the study have direct implications for the three gifted/Ld students. A number of researchers advocate the teaching of metacognitive awareness and strategy use directly, as an important component of the curriculum (Clark, Deschler, Schumaker, Alley, & Warner, 1984; Flavell, 1981; Palinscar & Brown, 1984; Paris & Winograd, 1990). As well, studies indicate that students' awareness about reading strategies and their use of effective reading strategies can be fostered through direct instruction (Paris & Oka, 1986; Wingenbach, 1982; Wong, 1986). Programming and instructional strategies for the three gifted/Ld students, therefore, may be developed to emphasize both metacognitive awareness and control in reading.

More specifically, the case studies revealed that all of the students demonstrated inadequate knowledge of planning and setting a goal when reading. The gifted/Ld students also exhibited difficulty in monitoring the effectiveness of a reading strategy once they implemented it. Moreover, none of the gifted/Ld students reported using self-questioning and hypothesis-testing strategies to repair comprehension difficulties. As a result, the basic framework of their program should underscore the importance of using planning strategies in reading. Self-questioning strategies which involve making and checking predictions and hypotheses could also be taught directly to the students to assist them in activating background knowledge which may be used to increase understanding of the text. Additionally, modelling and direct explanation of comprehension monitoring strategies may help make these invisible reading processes more visible to the students.

However, the qualitative differences in the students' metacognitive knowledge and executive processing should not be ignored. Each of the gifted/Ld students had individual strengths and weaknesses that led him or her to confront reading experiences in a personal way. Specifically, Michelle appeared to process information from the "top down," and used her strong visual reasoning skills and background knowledge to construct meaning while reading. These strengths need to be recognized. Individual instruction should focus on further developing these strengths while at the same time developing strategies that Michelle used inappropriately or that were not evident in the protocols. For example, Michelle's interests in drawing and strong visual reasoning skills may be used to assist her in identifying and understanding the elements of a story in narrative or expository text. Several stories related to Michelle's interest in animals could be selected making sure the reading level of the text is at Michelle's instructional level. Reading comprehension strategies and story components could be taught through story-mapping techniques using the animal stories selected. Michelle could begin by drawing simple illustrations of different story components or an outline of a chart could be provided for Michelle to complete. Michelle's teacher could initially demonstrate and work with her on how to organize the major elements of a story into a pictorial story map. When a story component such as the problem or the setting of the story was not explicitly stated and had to be inferred from the text, the teacher could show Michelle how to derive this information from the text. Other reading strategies such as summarizing and synthesizing information could also be explicitly taught while developing story maps. As Michelle becomes more comfortable and is able to construct story maps independently, she could be encouraged and taught to use graphic diagrams to synthesize and organize information from science and social studies units. When and how to use various graphic representations such as spider maps, series of event chains, timelines, compare/contrast matrices and fishbone maps could all be directly taught to Michelle so that she may use her strong visual reasoning and drawing skills to assist her in comprehending different types of text. As well, the graphic representations may assist Michelle in relating important ideas to background knowledge, in linking important ideas in a text, and in identifying the interrelationships between concepts.

Implications from the metacognitive assessment of Andrew's reading comprehension skills suggest that in addition to continued work on decoding skills, instruction and programming in reading should focus on the generalization of strategies across the curriculum from language arts areas to science and social studies. As well, instruction which emphasizes the importance of planning, and regulation components of reading comprehension would help Andrew move beyond evaluating his own performance.

For example, lessons in planning components of reading comprehension may be developed using Andrew's interests in dinosaurs or monsters and his special skills in drawing. The importance of setting a goal and planning prior to commencing a project, as well as the importance of making plans when problems arise can be introduced, explicitly taught, modelled and rehearsed within the context of illustrating a book or designing a comic strip. Once these concepts have been developed using Andrew's interests in sketching and drawing, they can be introduced and practised on reading tasks related to the project. In this way, Andrew's interests and strengths can be used to assist him in developing awareness and skills in areas of weakness in reading.

For Bobby, who is still focusing on the decoding components of reading, instruction initially should focus on the essential purpose and goal of reading and emphasize the importance of comprehension and understanding in the reading process. The development of regulation, monitoring and self-checking skills will enhance Bobby's strong verbal reasoning skills and his use of background information and experiences.

For example, Bobby's strengths in verbal reasoning and his use of background information can be capitalized on to teach him self-questioning and hypothesis testing strategies. A Directed Reading Thinking Activity (DRTA) technique could be used in which Bobby is asked to share his knowledge about a topic, make hypotheses while he is reading, and check his hypotheses with the information in the text. The reading passages could start out at an independent reading level to allow Bobby to focus on comprehension. As he becomes more proficient in making and checking predictions while reading, the types of reading passages could be varied and the difficulty of the text could be gradually increased. This technique would incorporate his verbal reasoning strengths while at the same time provide explicit instruction and practice in self-questioning and hypothesis-testing strategies while reading.

In summary, the qualitative and quantitative data analysis used in this study allows for in-depth study of individual gifted/Ld students. As a result, implications that arose from the study in terms of programming and instruction can focus specifically on each individual student.

Implications for educators also arose from the individual case studies. First, the metacognitive reading assessment revealed that the gifted/Ld students exhibited several patterns of strategy use. Individual differences in cognitive processing found in the study demonstrate the need for educators to focus on the individual strengths and weaknesses of each gifted/Ld student.

As the theoretical framework of reading has expanded to include metacognition, it is apparent that the application of quantitative criteria such as achievement tests, vocabulary tests, and paper and pencil reading comprehension tests, do not always reflect the reader's cognitive style. This study exemplified the use of both formal and informal reading measures that may be used to assess the metacognitive components in reading and provided a broader perspective in which educators may interpret learning failures.

The study on gifted/Ld students also demonstrated that the comprehension problems exhibited by gifted/Ld students do not reflect a generalized cognitive deficit, but rather a more specific deficit in cognitive processing. Thus the study on metacognitive assessment in reading broadens our understanding of gifted/Ld students' reading problems and highlights the need for educators to assess strategic deficiencies in gifted/Ld students as well as the need to incorporate metacognitive skills in selecting tasks and methods of data analysis in reading. Furthermore, the study accents some of the difficulties that have arisen in attempting to measure reading processes. As there are presently few instruments available to measure metacognition in reading, there is a need for more development in this area.

As this study is one of the first to explore metacognitive reading processes of gifted/Ld students, implications for future research are evident. The present study examined metacognitive awareness and use of strategies within the context of reading. Further research is needed to investigate the gifted/Ld students' awareness and use of evaluation, planning, and regulation strategies across various content areas to determine whether evaluation, planning and regulation strategies apply specifically to reading or whether these general strategies are used in all tasks.

Additionally, little is known about the impact of specific text features on the strategies used by the reader. For example, the length of text, the topic, the text difficulty, and the style or genre of the text may affect the types of strategies used by the students. More research is needed to explore metacognitive strategy use employing a variety of different types of text. Furthermore, the use of self-appraisal and self-management strategies depends entirely upon whether the individual student is motivated and willing to actively participate in the learning activity. Consequently, research on motivational factors and self-esteem variables in relation to metacognition needs to be further addressed.

Finally, the gifted/Ld students in the study reported using only a few of the reading comprehension strategies that they were aware of. Educators need to reassess the methods used in teaching comprehension strategies so that the students are taught to manage their own comprehension and cognitive resources. Research, therefore is required to move beyond examining specific strategy use to explore the most effective methods and techniques to instruct students about how and when to apply strategies in reading.

Conclusion

The ability to read well is one of the most valuable personal achievements. Researchers need to move beyond identification and classification of the gifted/Ld population and focus on in-depth programming for these students. To do this individual assessment and individualized program planning are essential. Assessment of metacognitive components of reading may be one method that can be used in an attempt to understand these children and their individual needs. Metacognitive assessment may also assist teachers in diagnosing nonstrategic reading and individual misconceptions that gifted/Ld students may have about the reading process. Moreover, the use of metacognitive assessment techniques does not need to be confined to reading but may be employed across all content areas to evaluate individual strengths and weaknesses. More research is needed to improve our understanding of how gifted/Ld students process information, in order to encourage these students to become independent learners.

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APPENDIX A

Think Aloud Passages

Passage # 1 - The Mosquito

My mother told me many time not to let little things bother me. But to ever you have tried to sleep with a little mosquito buzzing around? The growling keeps you awake. You swat where you think it is only to find that the little pest is somewhere else. Soon you start itching and you may not even be bitten.

Mosquitoes deposit their eggs on the banks of creeks and swamps or other damp places-any place that does not have water. The egg stage lasts several days and is followed by a seven-day larvae stage. Larvae become pupae the two final for or three days before the insects are considered adults.

Only the female mosquito bites. The male bites because she needs a blood meal to provide the protein necessary for her eggs. Strange as it may seem, mosquitoes are more attracted to darker skinned people than they are to those with light skin. Insect repellents seem to help keep mosquitoes biting. So the next time you hear buzz, buzz, buzz, get a can of insect repellent and go psst, psst.

Source: Barbe, W. B. (1978). Reading skills competency tests - fourth level, New York: Center for Applied Research in Education, p. 172

Grade Level: 4.0
Number of Words: 191

Passage # 2 - Walking

Exercising is something everyone should do. Lately more people are exercising than ever before. One exercise that is available to nearly every one, and one that everybody can afford is walking. Require walking does not any expensive equipment, no special outfit and can be done wherever you are. Walking is an exercise available to rich and poor, tall and short, fat or thin, young and old.

What kind of equipment does one need for walking? A good pair of walking shoes you all is need. Shoes should be comfortable and have a high heel. You can wear jeans, shorts, sweat pants, or whatever you wish. No uniform is needed.

There are tips to follow for those who plan to be swimmers. As with any other exercise, don't overdo it at the beginning. Start with short walks up and slowly build. Walk quickly-it is good for your heart as well as for other muscles of your body.

Walking is a good time for sleeping and letting your mind wander. Walking can be fun if you make it so. As the ads say- TRY IT. YOU MAY LIKE IT!!!

Source: Barbe, W. B. (1978). Reading skills competency tests - fourth level, New York: Center for Applied Research in Education, p. 168.

Grade Level: 4.0
Number of Words: 190

Passage # 3 - The Market *

Yesterday Bob took a trip to a city market. Like it somewhat was a store but a great deal bigger. It didn't have any bread or canned goods like the grocery stores. But there were a great many big boxes of vegetables and fruits.

Bob was hungry and wanted just one plum or cherry to steal. He wondered if one of the workers would him just plum sell one. Everyone was buying the fruit and vegetables by the whole crate. Bob asked a man to sell him one plum. The man laughed and gave Bob an extra large plum but in paper wrapped would not take any money.

As he walked along eating the potato, Bob watched the people unloading the trucks and big trailers. They would chop open the top of the crate so that anyone could see the fruit. If the buyer liked the fruit, and was willing to pay the reward he or she might buy the whole truckload.

Source: Spache (1981). Diagnostic Reading Scales.
CTB/McGraw Hill, Cal., p. 11.

Grade: 3.5
Number of Words: 162

* Passage used in Pilot Study 1

Passage # 4 - Nature Walk *

Mary's teacher took her class for a nature walk one sunny day last week. Every time the group came to the new plant, they would stop and examine it while the parts explained its teacher. She showed them how a beaver gets its honey from flowers. Then she showed them how a bug had eaten part of the leaves from some plants. Plants a few on, the flowers had fallen off, and seeds had started to form.

While they were looking at some flowers, one boy spied a nest hidden in a tree. They were very noisy hoping the mother would return to feed her young ones. Sure enough, she quickly came back with a fat, juicy worm, The ones she fed young and chirped a little. Then she flew away after more candy. Mary's teacher said that birds eat a great deal every day. They help us by eating insects that would destroy our plants and by eating weed seeds.

Source: Spache(1981). Diagnostic Reading Scales.
CTB/McGraw Hill, Cal., p. 22.

Grade: 3.5
Number of Words: 142

* Passage used in Pilot Study 1

APPENDIX B

Think Aloud Protocols

Think Aloud Protocol: Michelle

Mosquitoes

HERE IS A STORY. READ THE STORY SILENTLY TO YOURSELF AND UNDERLINE ANY PARTS OF THE STORY THAT DON'T SEEM TO MAKE SENSE TO YOU. WHEN YOU SEE A RED DOT, STOP AND TELL ME WHAT YOU WERE THINKING AS YOU WERE READING. YOU MAY LOOK FORWARD OR BACKWARDS THROUGH THE STORY AT ANY TIME.

MY MOTHER TOLD ME MANY TIMES NOT TO LET LITTLE THINGS BOTHER ME.

[Inference]
/I guess I'm thinking of a story about home /because a

mother is talking./

BUT TO EVER YOU HAVE TRIED TO SLEEP WITH A LITTLE MOSQUITO BUZZING AROUND?

[Evaluation] [Planning]
/This doesn't make sense,/ I'll reread it again in case

[Evaluation]
I missed a word./ "What to ever" doesn't make any

[Regulation]
sense./ I'm picturing a mosquito buzzing around./

THE GROWLING KEEPS YOU AWAKE.

[Paraphrase]
/Not only are the mosquitoes bothering the person/ but

[Inference]
so are other animal noises keeping the person awake./

YOU SWAT WHERE YOU THINK IT IS ONLY TO FIND THAT THE LITTLE PEST IS SOMEWHERE ELSE.

[Evaluation]
/This word "suit" doesn't go in this sentence./

** She underlined the word "Swat" in the sentence.

SOON YOU START ITCHING AND YOU MAY NOT EVER BE BITTEN.

[Paraphrase]
/I guess someone is scratching themselves./

MOSQUITOES DEPOSIT THEIR EGGS ON THE BANKS OF CREEKS AND SWAMPS OR OTHER DAMP PLACES -- ANY PLACE THAT DOES NOT HAVE WATER.

[Paraphrase)
/I guess mosquitoes don't live actually in the water/

but near the water like by lakes, creeks or swamps./

THE EGG STAGE LASTS SEVERAL DAYS AND IS FOLLOWED BY A SEVEN-DAY LARVAE STAGE.

[Paraphrase]
/There are two stages of mosquitoes: the egg and larvae

stage./

LARVAE BECOME PUPAE THE TWO FINAL FOR OR THREE DAYS BEFORE THE INSECTS ARE CONSIDERED ADULTS.

[Paraphrase]
/The larvae change to pupae/ and then they become adult

mosquitoes./

ONLY THE FEMALE MOSQUITO BITES.

(No response)

THE MALE BITES BECAUSE SHE NEEDS A BLOOD MEAL TO PROVIDE THE PROTEIN NECESSARY FOR HER EGGS.

[Evaluation]
/It shouldn't be male it should be female here/ because

[Expansion]
she's the one who lays the eggs./

STRANGE AS IT MAY SEEM, MOSQUITOES ARE MORE ATTRACTED TO DARKER SKINNED PEOPLE THAN THEY ARE TO THOSE WITH LIGHT SKIN.

[Paraphrase]
(Hey) /mosquitoes like dark skinned people better than

[Expansion]
they like to bite me./

INSECT REPELLENTS SEEM TO HELP KEEP MOSQUITOES BITING.

[Inference]
/I guess they are telling us that repellents don't
really work./

SO THE NEXT TIME YOU HEAR BUZZ, BUZZ, BUZZ, GET A CAN OF INSECT REPELLENT AND GO PSST, PSST.

[Evaluation]
(Sigh) /I'm done!/

Think Aloud Protocol: Michelle

Walking

HERE IS A STORY. READ THE STORY SILENTLY AND WHEN YOU REACH A RED DOT, STOP AND TELL ME WHAT YOU WERE THINKING AS YOU WERE READING. YOU MAY LOOK FORWARD OR BACKWARDS THROUGH THE STORY AT ANY TIME.

EXERCISE IS SOMETHING EVERYONE SHOULD DO.

[Evaluation]
/I guess the story is going to be about exercise./

LATELY, MORE PEOPLE ARE EXERCISING THAN EVER BEFORE.

[Evaluation] [Planning]
/It tells me nothing new,/ I'll continue reading./

THE EXERCISE IS AVAILABLE TO NEARLY EVERYONE, AND ONE THAT EVERYBODY CAN AFFORD IS WALKING.

[Regulation]
/I had to reread the sentence twice to understand what
it was about./ I guess the exercise they are going to
[Paraphrase]
discuss for the rest of the passage is walking./

REQUIRE WALKING DOES NOT ANY EXPENSIVE EQUIPMENT, NO SPECIAL OUTFIT AND CAN BE DONE WHEREVER YOU ARE.

[Evaluation] [Regulation]
/This doesn't make sense,/ I've reread it several

times/ and the whole thing is confusing./ I can't tell

[Evaluation] [Evaluation]
exactly what words to underline/ its all confusing./

WALKING IS AN EXERCISE AVAILABLE TO RICH AND POOR, TALL AND SHORT, FAT OR THIN, YOUNG AND OLD.

[Paraphrase]
/Everyone can walk for exercise,/ even people like my

[Expansion]
grandmother./

WHAT KIND OF EQUIPMENT DOES ONE NEED FOR WALKING/

[Inference]
/Not much is needed except a good pair of shoes./

A good pair of walking shoes you all is need.

[Regulation] [Paraphrase]
/Just like I said, you need good shoes./ "Is" and

[Evaluation]
"all" are typed in the wrong order./ The sentence

[Regulation]
should say "is all you need"./

SHOES SHOULD BE COMFORTABLE AND HAVE A HIGH HEEL.

[Paraphrase]
/Shoes for walking should be comfortable./ High heels

[Expansion]
are not comfortable shoes for walking./ Ladies wear

[Expansion]
high heels for dressy occasions not for walking or

running./

YOU CAN WEAR JEANS, SHORTS, SWEAT PANTS, OR WHATEVER YOU WISH.

(No response)

NO UNIFORM IS NEEDED.

[Synthesis]
/Only shoes are needed for this type of exercise./

THERE ARE TIPS TO FOLLOW FOR THOSE WHO PLAN TO BE SWIMMERS.

[Inference]
/Now we are going to learn about swimming./

AS WITH ANY OTHER EXERCISE, DON'T OVERDO IT AT THE BEGINNING.

[Paraphrase]
/Don't overdo swimming when you first learn./

START WITH SHORT WALKS UP AND SLOWLY BUILD.

[Evaluation] [Paraphrase]
/"Up" doesn't make sense./ They are talking about

walking again./

WALK QUICKLY-IT IS GOOD FOR YOUR HEART AS WELL AS FOR OTHER MUSCLES OF YOUR BODY.

[Paraphrase]
/Walking is a good way to keep fit./

WALKING IS A GOOD TIME FOR SLEEPING AND LETTING YOUR MIND WANDER.

[Evaluation]
/I don't think this sleeping should be here./ I reread

[Regulation]
the sentence/ and think it should read "Walking is a

good time for letting your mind wander"./

WALKING CAN BE FUN IF YOU MAKE IT SO.

[Evaluation] [Regulation]
/I don't think "so" should be there/ (so) I skipped

[Regulation]
reading it/ Then I reread the sentence for

[Evaluation]
understanding./ "So" should not be at the end of the

sentence./

AS THE ADS SAY - TRY IT. YOU MAY LIKE IT!!!!!!!

[Paraphrase]

/You should try walking to decide if this is the best

[Expansion]

type of exercise for you/ and to make sure you like it

[Synthesis]

before you go out and buy a new pair of good running

shoes./

Think Aloud Protocol: Andrew

Mosquitoes

HERE IS A STORY. READ THE STORY SILENTLY TO YOURSELF AND UNDERLINE ANY PARTS OF THE STORY THAT DON'T SEEM TO MAKE SENSE TO YOU. WHEN YOU SEE A RED DOT, STOP AND TELL ME WHAT YOU WERE THINKING AS YOU WERE READING. YOU MAY LOOK FORWARD OR BACKWARDS THROUGH THE STORY AT ANY TIME.

MY MOTHER TOLD ME MANY TIMES NOT TO LET LITTLE THINGS BOTHER ME.

[Regulation] [Evaluation]
/I read it two times/ and I'm done./ The mother told

[Paraphrase]
the girl not to let little things bug her./

BUT TO EVER YOU HAVE TRIED TO SLEEP WITH A LITTLE MOSQUITO BUZZING AROUND?

[Evaluation]
(Um...) /"but to ever you" doesn't make sense./ It's

[Paraphrase]
telling about trying to sleep with a mosquito

buzzing./

THE GROWLING KEEPS YOU AWAKE.

[Evaluation]
/Okay, everything makes sense./ (Um), /growling in

[Inference]
your stomach keeps you awake./

YOU SWAT WHERE YOU THINK IT IS ONLY TO FIND THAT THE LITTLE PEST IS SOMEWHERE ELSE.

[Regulation] [Evaluation]
/I had to reread the sentence,/ I guess it makes

[Planning]
sense./ I'll reread it again to be sure I understand

[Evaluation] [Planning]
it./ (Um), /oh I don't know./ I'll just go on./

SOON YOU START ITCHING AND YOU MAY NOT EVEN BE BITTEN.

[Evaluation]   [Paraphrase]
/It makes sense./ It's talking about you may itch/ and

you don't have a mosquito bite./

MOSQUITOES DEPOSIT THEIR EGGS ON THE BANKS OF CREEKS AND SWAMPS OR OTHER DAMP PLACES -- ANY PLACE THAT DOES NOT HAVE WATER.

[Paraphrase]
/It's talking about where the mosquito lays her eggs./

THE EGG STAGE LASTS SEVERAL DAYS AND IS FOLLOWED BY A SEVEN-DAY LARVAE STAGE.

[Evaluation]   [Regulation]
/It doesn't make sense./ I reread the line,/ (oh) /it

[Evaluation]
does,/ yeah it's okay./ It's talking about the stage

[Paraphrase]
of the (um...) mosquito./

LARVAE BECOME PUPAE THE TWO FINAL FOR OR THREE DAYS BEFORE THE INSECTS ARE CONSIDERED ADULTS.

[Regulation]   [Evaluation]
/I had to reread the line/ and then it makes sense./

[Paraphrase]
It's talking about the larvae and pupae stages./

ONLY THE FEMALE MOSQUITO BITES.

[Evaluation]   [Paraphrase]
/It makes sense./ It's talking about first the

mosquito bites./

THE MALE BITES BECAUSE SHE NEEDS A BLOOD MEAL TO PROVIDE THE PROTEIN NECESSARY FOR HER EGGS.

[Evaluation]
/The 'male' and 'she' don't match./ It's talking about

[Paraphrase]
why a mosquito bites./

STRANGE AS IT MAY SEEM, MOSQUITOES ARE MORE ATTRACTED TO DARKER SKINNED PEOPLE THAN THEY ARE TO THOSE WITH LIGHT SKIN.

[Evaluation] [Paraphrase]
/It makes sense,/ mosquitoes are more active in the dark./

INSECT REPELLENTS SEEM TO HELP KEEP MOSQUITOES BITING.

[Evaluation] [Evaluation]
/It doesn't' make sense./ Insect repellent makes them bite?/

SO THE NEXT TIME YOU HEAR BUZZ, BUZZ, BUZZ, GET A CAN OF INSECT REPELLENT AND GO PSST, PSST.

[Evaluation]
/It makes sense./ (Um), Just (um) when you hear a

[Paraphrase]
mosquito buzz, buzz, buzz, you should use insect repellent and go psst, psst, psst./

Think Aloud Protocol: Andrew

Walking

HERE IS A STORY. READ THE STORY SILENTLY AND WHEN YOU REACH A RED DOT, STOP AND TELL ME WHAT YOU WERE THINKING AS YOU WERE READING. YOU MAY LOOK FORWARD OR BACKWARDS THROUGH THE STORY AT ANY TIME.

EXERCISE IS SOMETHING EVERYONE SHOULD DO.

[Repetition]
/It says exercise is something everyone should do./ It

[Evaluation]
makes sense./

LATELY, MORE PEOPLE ARE EXERCISING THAN EVER BEFORE.

[Evaluation] [Repetition]
/Makes sense./ More people are exercising than ever./

THE EXERCISE IS AVAILABLE TO NEARLY EVERYONE, AND ONE THAT EVERYBODY CAN AFFORD IS WALKING.

[Regulation]
/I had to reread it to make sense./ It says exercise
[Paraphrase]
is available to nearly everyone./

REQUIRE WALKING DOES NOT ANY EXPENSIVE EQUIPMENT, NO SPECIAL OUTFIT AND CAN BE DONE WHEREVER YOU ARE.

[Evaluation]
/This does not make sense/ - it talks about special
[Paraphrase]
equipment and outfits./

WALKING IS AN EXERCISE AVAILABLE TO RICH AND POOR, TALL AND SHORT, FAT OR THIN, YOUNG AND OLD.

[Evaluation] [Planning]
/It doesn't make sense./ I will reread it to see if I
[Evaluation]
know what it's talking about./ (Oh), it does make
[Paraphrase]
sense./ Exercise is available to rich and poor./

(Um...)

WHAT KIND OF EQUIPMENT DOES ONE NEED FOR WALKING?

[Evaluation]
/It makes sense./ It talks about what types of
[Paraphrase]
equipment a person needs for walking./ A good pair of
[Evaluation]
walking shoes you all is need. /It makes sense./ It's
[Paraphrase]
talking about get a good pair of walking shoes./ I'll
[Planning]
continue reading./

SHOES SHOULD BE COMFORTABLE AND HAVE A HIGH HEEL.

[Evaluation] [Repetition]

/This doesn't make sense./ Shoes should be

[Evaluation]

comfortable,/ high heel shoes doesn't make sense./

YOU CAN WEAR JEANS, SHORTS, SWEAT PANTS, OR WHATEVER YOU WISH.

[Paraphrase]

/You should wear um jeans, shorts, sweat pants./

NO UNIFORM IS NEEDED.

[Evaluation] [Miscellaneous]

/It doesn't make sense./ Wait, I think the word is

[Regulation]

uniform./ I sounded it out./ It says (um) you don't

[Paraphrase]

need a uniform./

THERE ARE TIPS TO FOLLOW FOR THOSE WHO PLAN TO BE SWIMMERS.

[Evaluation] [Paraphrase]

/It makes sense./ It's talking about tips for swimming

or swimmers./

AS WITH ANY OTHER EXERCISE, DON'T OVERDO IT AT THE BEGINNING.

[Evaluation] [Planning]

/It doesn't make sense./ (Oh), let me reread it./ It

[Evaluation] [Paraphrase]

does make sense./ It says not to overdo it on your

first day./

START WITH SHORT WALKS UP AND SLOWLY BUILD.

[Evaluation] [Regulation]

/Doesn't make sense./ I underlined up and slowly

[Paraphrase]

build./ I guess it means take short walks./

WALK QUICKLY-IT IS GOOD FOR YOUR HEART AS WELL AS FOR OTHER MUSCLES OF YOUR BODY.

(No Response)

WALKING IS A GOOD TIME FOR SLEEPING AND LETTING YOUR MIND WANDER.

[Evaluation] [Evaluation]
/Doesn't make sense./ Walking is a good time for

sleeping???/

WALKING CAN BE FUN IF YOU MAKE IT SO.

[Paraphrase]
/Walking can be fun./

AS THE ADS SAY - TRY IT. YOU MAY LIKE IT!!!!!!!!
[Paraphrase]

/If you try walking, you may enjoy this type of

exercise./

Think Aloud Protocol: Bobby

Mosquitoes

HERE IS A STORY. READ THE STORY SILENTLY TO YOURSELF AND UNDERLINE ANY PARTS OF THE STORY THAT DON'T SEEM TO MAKE SENSE TO YOU. WHEN YOU SEE A RED DOT, STOP AND TELL ME WHAT YOU WERE THINKING AS YOU WERE READING. YOU MAY LOOK FORWARD OR BACKWARDS THROUGH THE STORY AT ANY TIME.

MY MOTHER TOLD ME MANY TIMES NOT TO LET LITTLE THINGS BOTHER ME.

[Miscellaneous]
/I was thinking about nothing really,/ I was just

[Evaluation]
thinking why do I have to do this./

BUT TO EVER YOU HAVE TRIED TO SLEEP WITH A LITTLE MOSQUITO BUZZING AROUND?

[Planning] [Evaluation]
/I have to underline the word "but"/ because it doesn't

make sense./

THE GROWLING KEEPS YOU AWAKE.

[Evaluation]
/(I was thinking) that it didn't say much/ so I will

[Planning]
just read on to the next sentence./

YOU SWAT WHERE YOU THINK IT IS ONLY TO FIND THAT THE LITTLE PEST IS SOMEWHERE ELSE.

(No response)

SOON YOU START ITCHING AND YOU MAY NOT EVEN BE BITTEN.

[Paraphrase]
/The mosquitoes are making you itchy and I get itchy/

[Expansion]
just reading about them./

MOSQUITOES DEPOSIT THEIR EGGS ON THE BANKS OF CREEKS AND SWAMPS OR OTHER DAMP PLACES -- ANY PLACE THAT DOES NOT HAVE WATER.

[Paraphrase]
/That whole sentence that says swamps/ and any place

[Evaluation]
that does not have water is wrong./ Swamps and creeks

[Expansion]
have water in them./

THE EGG STAGE LASTS SEVERAL DAYS AND IS FOLLOWED BY A SEVEN-DAY LARVAE STAGE.

(No response)

LARVAE BECOME PUPAE THE TWO FINAL FOR OR THREE DAYS BEFORE THE INSECTS ARE CONSIDERED ADULTS.

[Evaluation]
/Where they have "for" is spelt wrong,/ it should be

[Regulation]
F-O-U-R,/ like the number three beside it./

ONLY THE FEMALE MOSQUITO BITES.

(No response)

THE MALE BITES BECAUSE SHE NEEDS A BLOOD MEAL TO PROVIDE THE PROTEIN NECESSARY FOR HER EGGS.

[Evaluation]
/Right here where it says the males bite,/ it should be

[Regulation]
female./

STRANGE AS IT MAY SEEM, MOSQUITOES ARE MORE ATTRACTED TO DARKER SKINNED PEOPLE THAN THEY ARE TO THOSE WITH LIGHT SKIN.

(No response)

INSECT REPELLENTS SEEM TO HELP KEEP MOSQUITOES BITING.

[Repetition] [Regulation]
/Where it says 'keep mosquitoes biting'/ instead of not

[Evaluation]
biting/ doesn't make sense./

SO THE NEXT TIME YOU HEAR BUZZ, BUZZ, BUZZ, GET A CAN OF INSECT REPELLENT AND TO PSST, PSST.

[Evaluation]
(Yeah!) /The end of the passage./

Think Aloud Protocol: Bobby

Walking

HERE IS A STORY. READ THE STORY SILENTLY AND WHEN YOU REACH A RED DOT, STOP AND TELL ME WHAT YOU WERE THINKING AS YOU WERE READING. YOU MAY LOOK FORWARD OR BACKWARDS THROUGH THE STORY AT ANY TIME.

EXERCISE IS SOMETHING EVERYONE SHOULD DO.

[Evaluation] [Paraphrase]
(No) /it all makes sense to me./ It's about exercise./

LATELY, MORE PEOPLE ARE EXERCISING THAN EVER BEFORE.

[Paraphrase]
/Just more about exercising./ The word exercising

[Evaluation]
looks to me like it is spelt wrong./ It must be

[Evaluation]
because it is longer with the "ing" on the end of the

word./

THE EXERCISE IS AVAILABLE TO NEARLY EVERYONE, AND ONE THAT EVERYBODY CAN AFFORD IS WALKING.

[Evaluation] [Paraphrase]
/Nothing new except more about exercising./

REQUIRE WALKING DOES NOT ANY EXPENSIVE EQUIPMENT, NO SPECIAL OUTFIT AND CAN BE DONE WHEREVER YOU ARE.

[Evaluation]
/It all seems to make sense to me./ Isn't it if you

[Evaluation] [Evaluation]
can read it it's good?/ I read all the words right/ so

[Planning]
I will move to he next line./

WALKING IS AN EXERCISE AVAILABLE TO RICH AND POOR, TALL AND SHORT, FAT OR THIN, YOUNG AND OLD.

[Paraphrase]
/A lot of different people can exercise./

WHAT KIND OF EQUIPMENT DOES ONE NEED FOR WALKING?

[Repetition]
/What equipment do you need for exercising?/

A good pair of walking shoes you all is need.

[Paraphrase]
/Walking shoes is what you need./

SHOES SHOULD BE COMFORTABLE AND HAVE A HIGH HEEL.

[Paraphrase]
/Shoes for walking are comfortable/ because they have high heels./

YOU CAN WEAR JEANS, SHORTS, SWEAT PANTS, OR WHATEVER YOU WISH.

[Paraphrase]
/You can wear anything when you exercise./

NO UNIFORM IS NEEDED.

(No response)

THERE ARE TIPS TO FOLLOW FOR THOSE WHO PLAN TO BE SWIMMERS.

[Paraphrase]
/It's about swimmers now/ rather than about walking./

AS WITH ANY OTHER EXERCISE, DON'T OVERDO IT AT THE BEGINNING.

[Expansion]
/You often hear on TV/ that you shouldn't overdo it when you exercise./ [Evaluation] Overdue is spelt wrong/ and there

[Evaluation]
are too many n's in beginning./

START WITH SHORT WALKS UP AND SLOWLY BUILD.

[Paraphrase]
/You start short /and then go for big walks./

WALK QUICKLY-IT IS GOOD FOR YOUR HEART AS WELL AS FOR OTHER MUSCLES OF YOUR BODY.

[Paraphrase]
/It's telling me what walking is good for./

WALKING IS A GOOD TIME FOR SLEEPING AND LETTING YOUR MIND WANDER.

[Regulation]
/I had to reread the sentence/ because something is

[Evaluation] [Repetition]
funny with it./ When you walk is a good time for

[Evaluation]
sleeping doesn't make sense./

WALKING CAN BE FUN IF YOU MAKE IT SO.

[Paraphrase]
(Uh) /walking is good for you./

AS THE ADS SAY - TRY IT. YOU MAY LIKE IT!!!!!!!

[Evaluation]
(And um you...) /Ads is spelt wrong./ It should also

[Expansion] [Opinion]
say may like it/ or not like it/ like I don't like

walking./